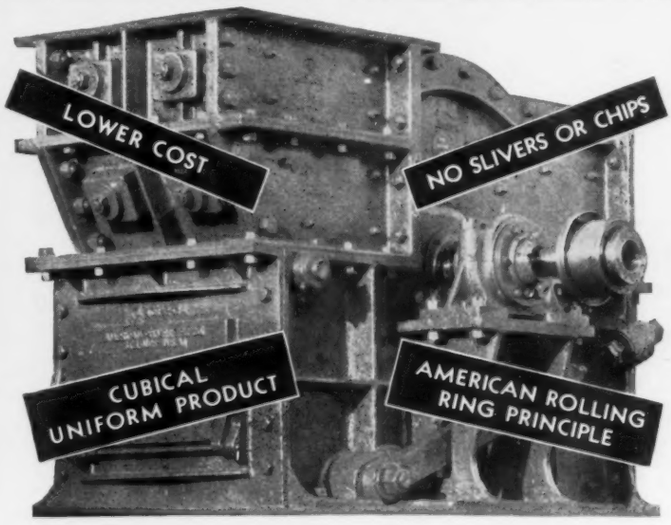
Pit and Quarry

With which is consolidated

CEMENT-MILL & QUARRY

18974

January, 1934



X ★ Y = Z

[your price] [your cost] [your profit]

★ If "X" is constant (minimum prices promise to prevail generally), then the only way to increase "Z" is to decrease "Y". That's straight algebra.

One of the principal producing costs is the crusher. Reduce this cost, and you've solved a big problem.

That is where we come in.

The American Rolling Ring Crusher is on an entirely different principle. The rings outlast other types of hammers because they roll as they crush and, therefore, are worn uniformly over their entire outer circumference. They produce a product that is most uniform and cubical in shape—a product that is highly desirable by the user. There are no slivers or chips. It is ideal for YOUR customers.

And the costs? A small capital investment. Low power costs. Fewer repair bills because of tramp iron protection. You will want more information about this excellent crusher. Why not tell us your problems so that we can show you how this crusher will fit into your scheme of things.

This coupon is for your convenience. If you'd rather not cut up this cover, tell us in a letter, postcard, wire—anyway—to give you proof of these statements. You don't have to be in the market to buy—we want you to know about this new crusher, for the more it is intelligently known, the more sales it will have. Send us your request—TODAY.

American Pulverizer Company
1273 Macklind Ave., St. Louis, Mo.
Please send me complete information about the new American Rolling Ring Crushers.
Name .....
Firm .....
Address .....
Town ..... State .....

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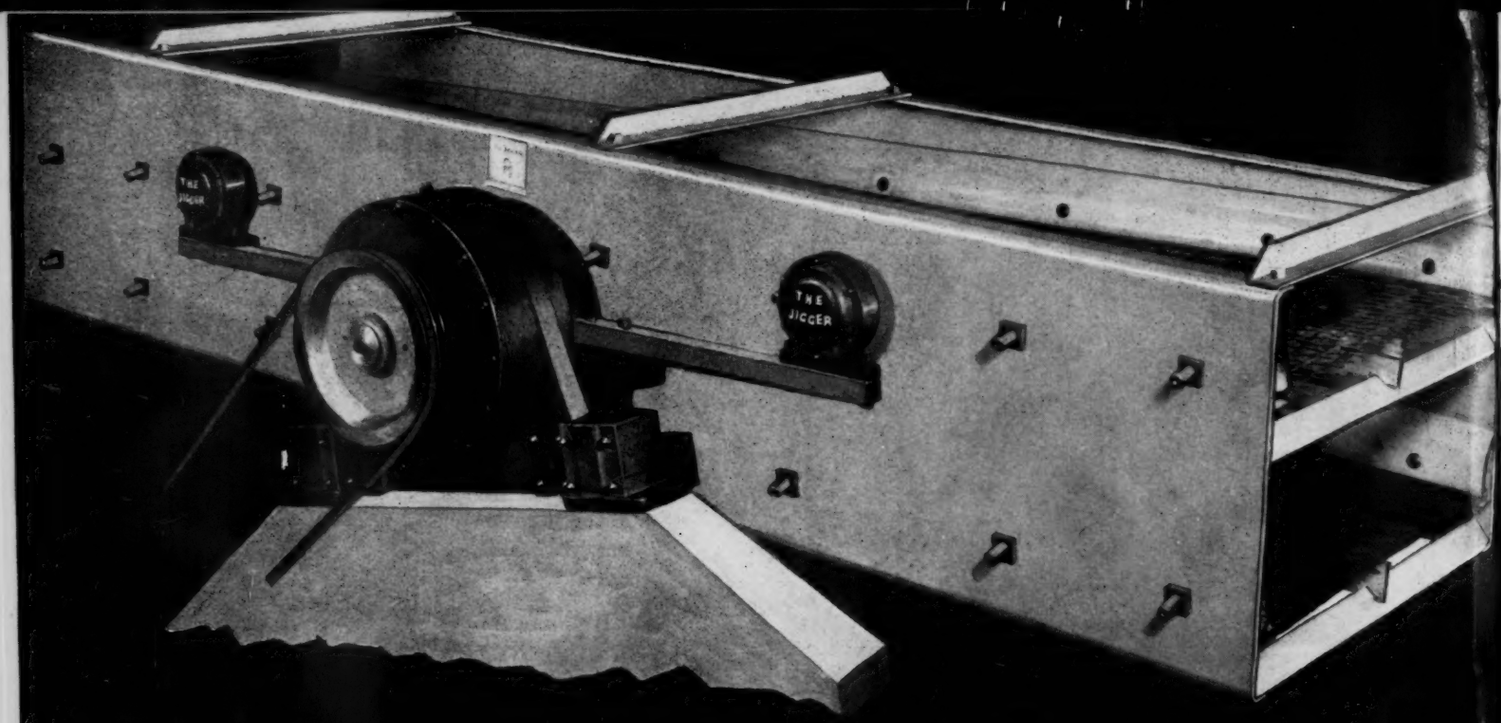
AMERICAN ROLLING RING CRUSHER

Originators and Manufacturers of Ring Crushers and Pulverizers

★ Pages 25-27

Since 1929 the largest net paid A. B. C. producer circulation in the field



THE SAFETY JIGGER "CIRCLE THROW" VIBRATING SCREEN

With VIBRATION TO SUIT MATERIAL

● No two materials screen alike. Even though they come from the same deposit there are often daily changes that make necessary a change in screen vibration for maximum efficiency.

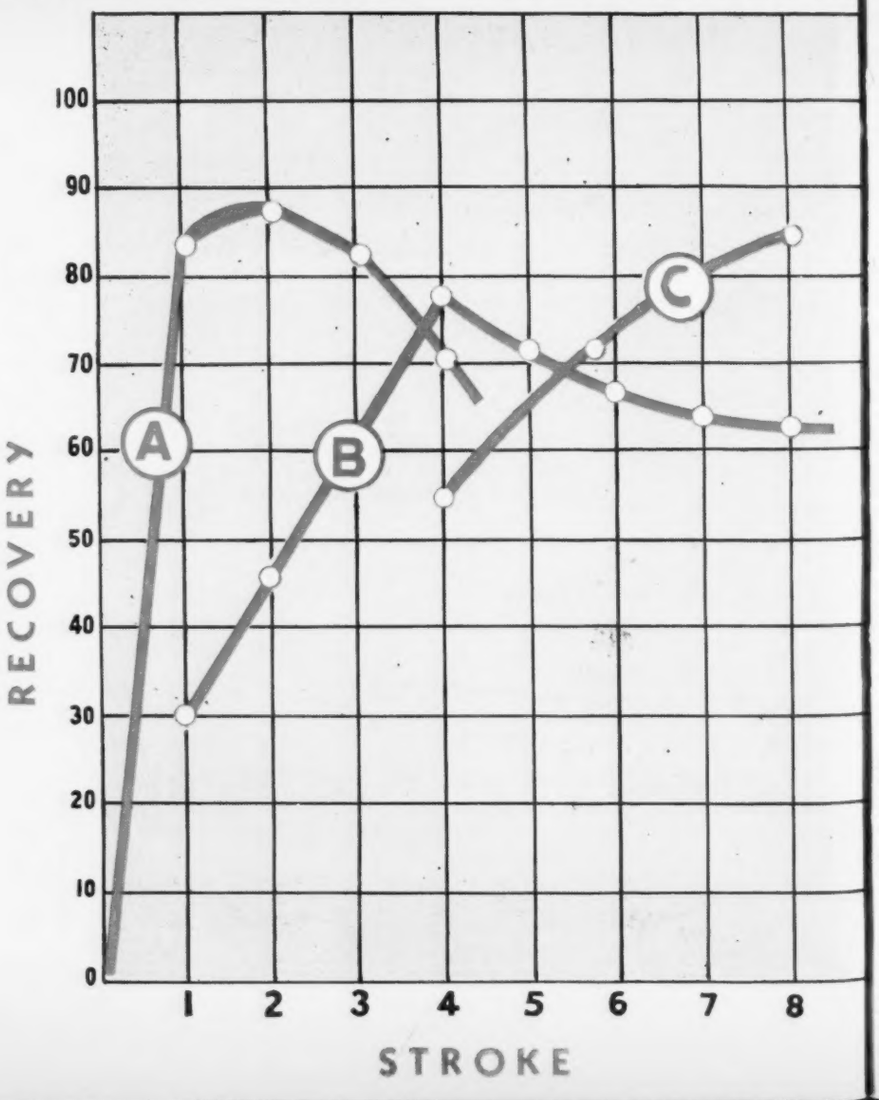
The chart on the right shows how three different materials vary in screening. Note how a change in vibration increases or decreases the efficiency of each. How, then, can the relationship of material to vibration be predetermined at the screen factory?

JIGGER engineers advocate determining this at *your plant* with *your product.*

That's the reason JIGGER screens are *producing more* and *giving a better product.*

And that's the reason more than 50% of all JIGGER installations replace other screening equipment.

Write today—let a JIGGER engineer help solve your screening problems—no obligation, of course.



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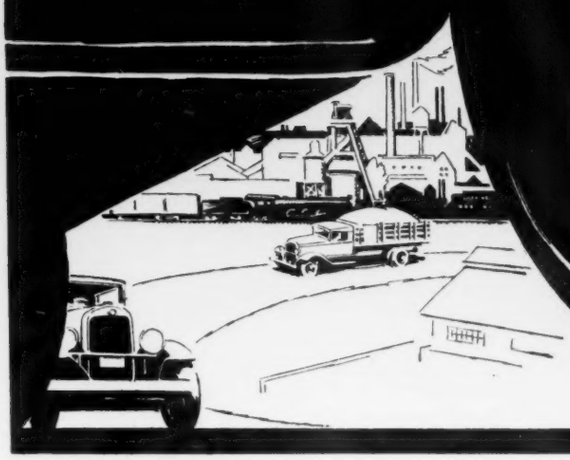

The GMC heavy duty line can provide *any* type of equipment—*exactly fitted to your particular needs.* No other line of commercial vehicles is so extensive or complete.

Eleven basic models cover the 5 to 15 ton range. GMC trailer equipment gives capacities to 22 tons. Six heavy duty engines are *regularly* available—uniform-design, 6-cylinder, valve-in-head, all of them! Forty-four distinct chassis . . . 14 rear axles . . . 7 transmissions—are *standard, available* selections for heavy duty use!

And, mark you—every GMC heavy duty truck is a regular production job! *From bumper to tail lamp—every one is truck-built by GMC!*

This is the industry's most comprehensive line of heavy duty trucks and trailers. It is matched, and rounded to completion, by a truck-built line of light and medium duty vehicles from 1½ to 4½ tons capacity.

Fitting commercial equipment *to your particular needs* can be done, with *scientific exactitude,* only with GMCs! The GMC representative is equipped to determine precisely the heavy duty truck that will do your job best . . . and most economically. Write or wire for further details—*today.*

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Pit and Quarry

With which is consolidated
CEMENT-MILL & QUARRY

Volume 26 January, 1934 Number 7

Published on the first of each month for producers and manufacturers of Cement, Crushed Stone, Gypsum, Lime, Sand, Gravel and other non-metallic minerals. Entered as second-class matter November 28, 1932, at the Postoffice at Chicago, Ill., under the Act of March 3, 1879.

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NRA MEMBER U.S. WE DO OUR PART

HAVE YOU SEEN the NEW LIMA 701?

1¾ Yd

THE Type 701 is not just another 1¾ yard excavator. Its design embodies many profitable features not found in other machines of the same capacity. Special steels are used throughout. Every part is built to give trouble-free operation in the hardest kind of digging. The boom and dipper handle are of box type design to insure great strength and durability.

Noisy spur gears have been discarded for the quiet long life helical type. Roller bearings are used throughout -- thus practically eliminating friction. Drums have exceptionally large diameters which are responsible for the long life of the cables. The swing, hoist, propel, steer and boom motions are independent -- thus making the Type 701 an ideal machine for crane work.

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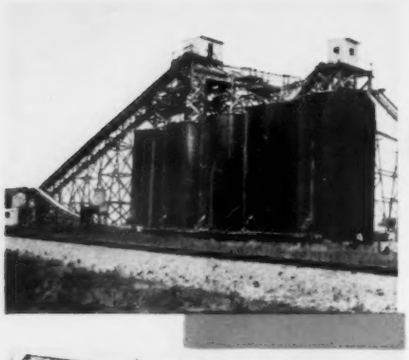


A modern Link-Belt sand and gravel preparing plant.

A battery of three Shaw sand classifiers.

The Link-Belt shovel - crane - dragline is built for heavy-duty service in capacities from ¾ to 2½ yds.

The "Grizzly" crawler loader. A real high capacity cost-reducing unit.

Prepare to meet the more rigid specifications which will prevail this year, particularly in connection with public works construction. Engineers and architects are demanding cleaner, better-graded aggregates. You can meet these demands and at the same time reduce your production costs. Modern, cost-reducing equipment is the answer.

The complete Link-Belt line includes every form of mechanical handling and preparation equipment—for washing, grading, elevating, conveying; as well as excavating.

Link-Belt has brought to the highest point of standardization, commensurate with sound engineering, the elements of handling and preparation equipment, and the positive power transmitting units for them. Link-Belt designs offer economy and flexibility of layout, with equipment developed for specialized services.

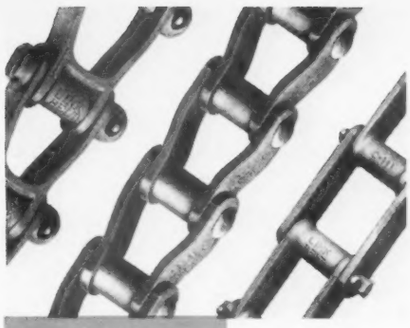
Steel apron feeder for aggregates. Part of Link-Belt elevating and conveying equipment at mixing plant of Ready Mixed Concrete Corporation.

The Link-Belt vibrating screen for coarse and fine grading. "A Triumph of Mechanical Vibration."

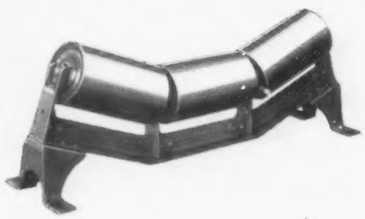
A complete line of washing and dewatering units of the log, screw, flight, screen and scrubber types.

LINK-BELT

AN ALL-AROUND BETTER PRODUCT IN 1934

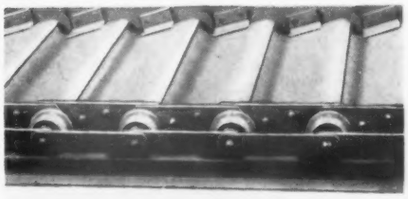


Chains of all types and sizes, made of Promal, malleable iron or steel.



Link-Belt anti-friction belt conveyor idlers. A type for every service.

You can get genuine Link-Belt replacement parts from extensive stocks. For instance, we carry over 20,000 sprockets in stock at all times. Bearings, Gears, Clutches; Chains of Steel, Malleable or Promal (the stronger, longer-wearing metal); Buckets, Conveyor Idlers, Screens, P.I.V.Gear, Speed Reducers; Silent Chain and Roller Chain Drives, and other parts.



Standard steel apron conveyor for sand, gravel, stone, lime, etc.

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- No. 1362—Vibrating Screens
- No. 1256—Grizzly Crawler Loader
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- No. 1292—Car Spotters
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- No. 125—Silent Chain Drives
- No. 1215—Speed Reducers
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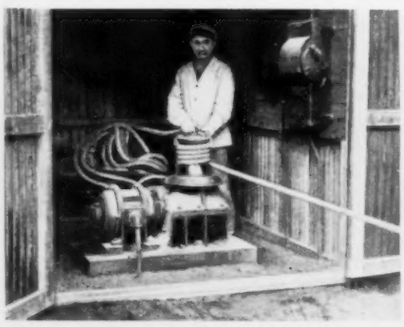
INDIANAPOLIS SAN FRANCISCO PHILADELPHIA TORONTO

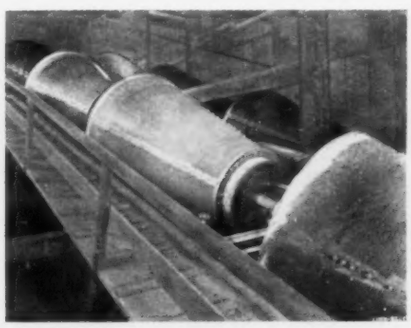
Offices in All Principal Cities 4896

20,000 sprockets always in stock for immediate shipment.

Link-Belt car spotter. A time and money saver for moving railroad cars quickly.



Inclined conical screens; also furnish vibrating, bar, rotary—all types.



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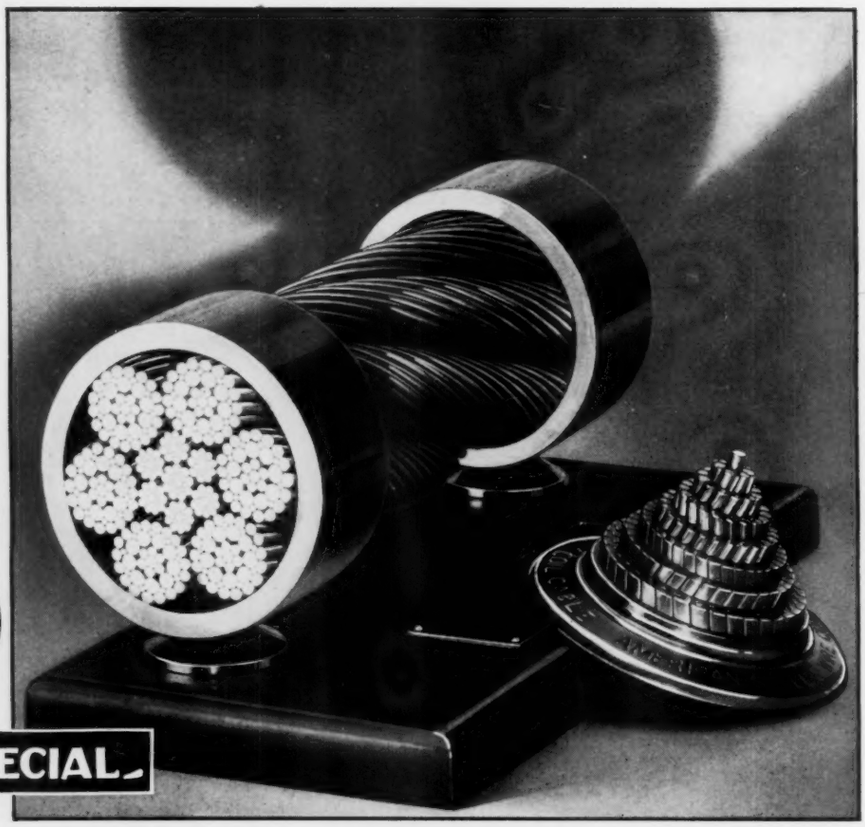
The TIGER TRADE MARK is a symbol of Strength and Dependability
THE MARK FOR *GENUINE* AMERICAN WIRE ROPE



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WHEN an out of the ordinary task for wire rope presents itself—when record size or unusual application is needed—it is only natural for industry to call upon this organization for an efficient and economical solution. The ropes illustrated above demonstrate the adaptability of our facilities and service to best meet every need—regardless of the job to be done. The exceptional quality and service that has made American Steel & Wire Company Wire Rope the largest selling brand in the world —is placed unreservedly at your disposal.

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THE NEW

WESTERN PRIMARY BREAKER

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CRUSHING, WASHING AND SCREENING EQUIPMENT

Western No. 100 Portable Crushing and Screening Plant with long discharge conveyor to portable storage bin.

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Name .....
Address .....
City ..... State .....

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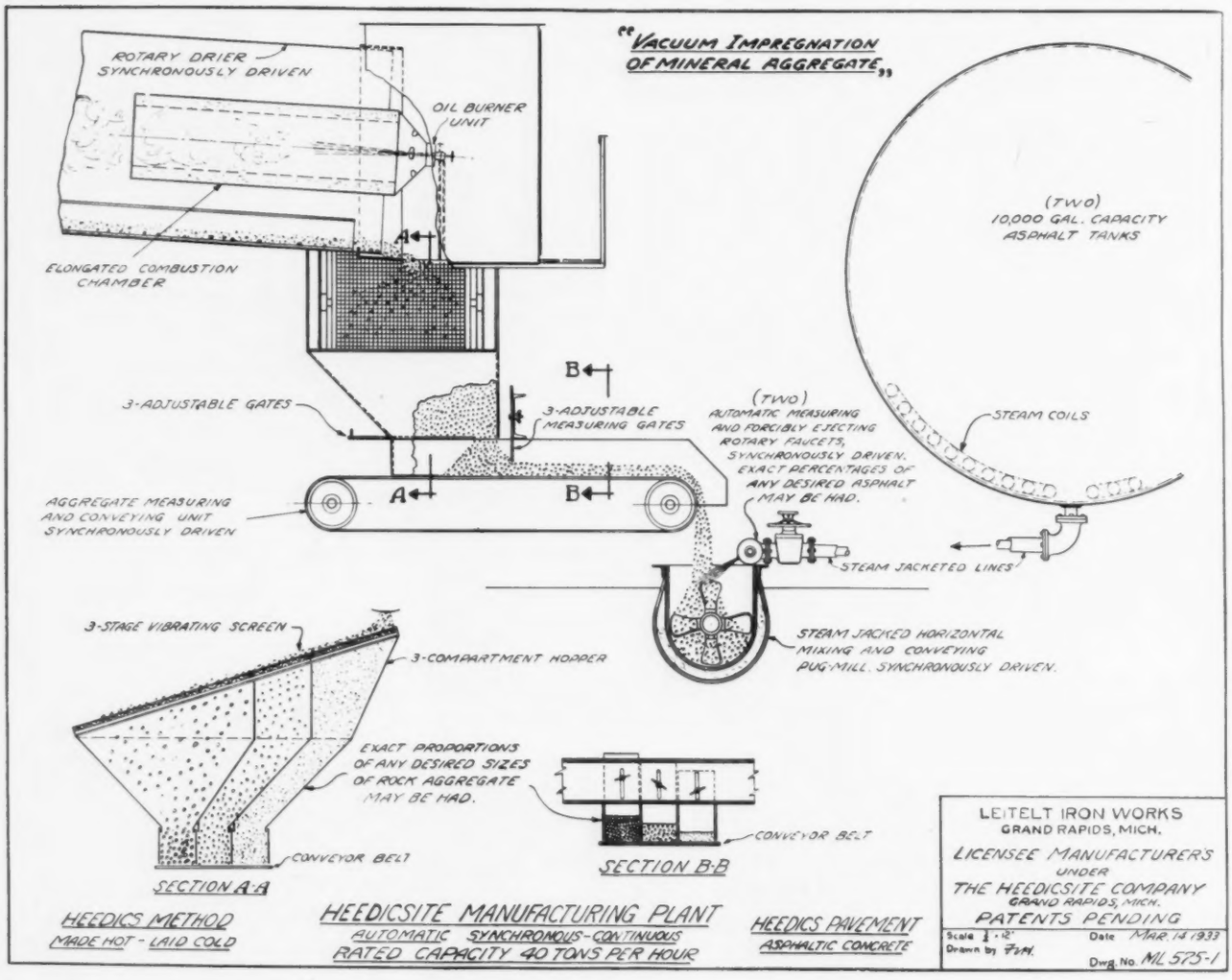
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STEAM JACKETED LINES
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3-STAGE VIBRATING SCREEN
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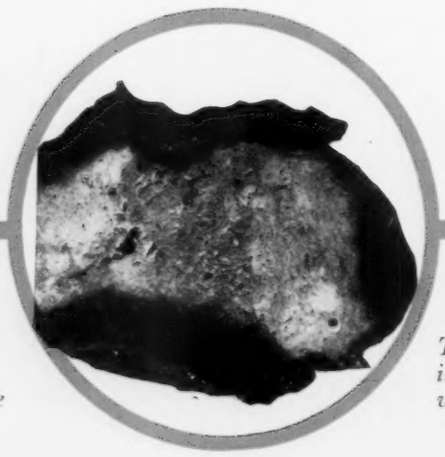
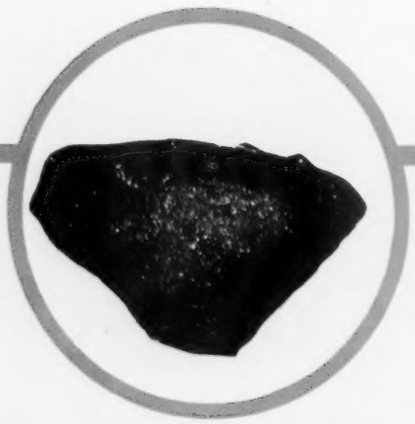
Vacuum impregnation



Limestone impregnated with Heedicsite



Trap rock impregnated with Heedicsite

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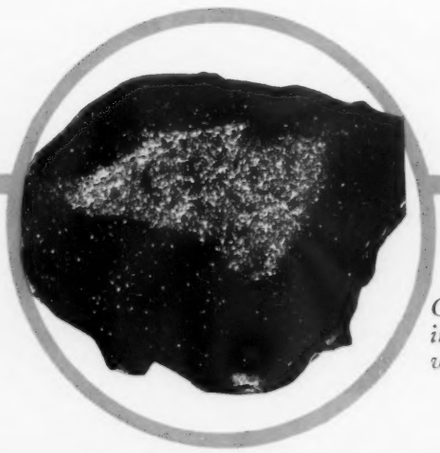
OWN AGGREGATE ● **SELL A FINISHED PRODUCT**

of mineral aggregate



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The Heedicsite Company
Grand Rapids, Michigan

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COMPANY .....

STREET .....

CITY ..... STATE.....

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There Is a Size and Type for Every Job

Tell us what you need. Our engineers will help you solve your problem.

We thank the many who have contributed to the upturn in our business

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UNIVERSAL WHENEVER A DEPENDABLE **CRUSHER**
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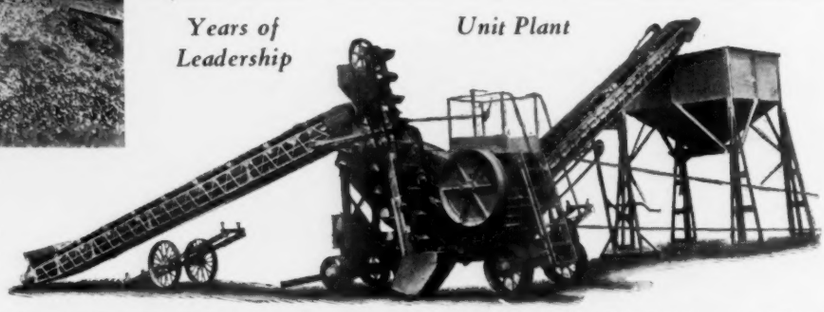
A complete catalogue is yours for the asking.

Years of Leadership

Unit Plant



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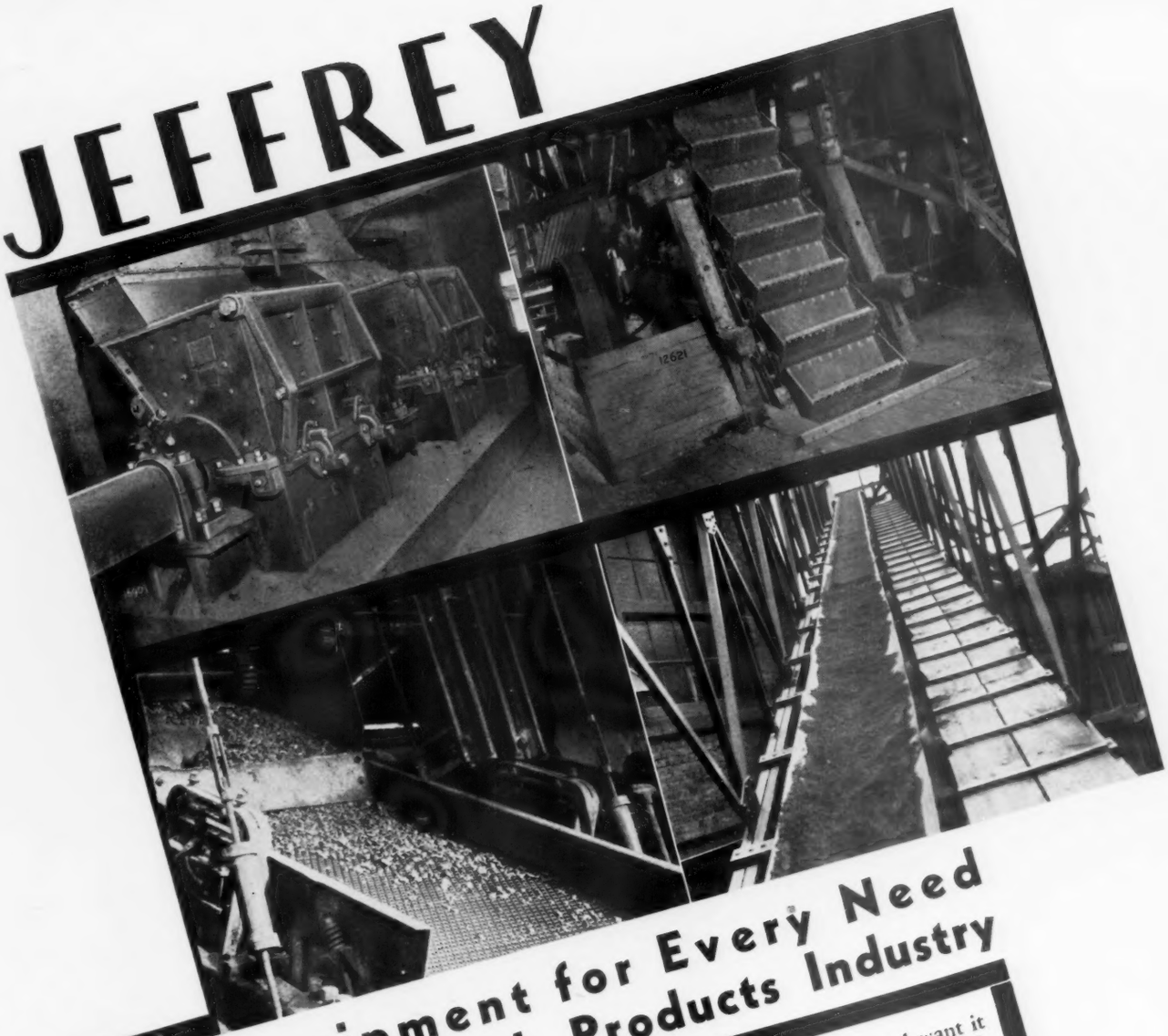
JEFFREY



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Branch Offices: Toronto—Calgary—Vancouver

THE SPIRIT OF ACHIEVEMENT

The new Philadelphia Saving Fund Building at Philadelphia is an outstanding example of modern engineering and architecture. Photograph by Howland Pike.

Thermoid Products are engineered with the same spirit of achievement that has produced the world's modern buildings.

Engineering turns *ideas* into *actualities.* A man wants a better building—and engineering supplies it. A man wants a better belt, a better hose, a better packing and engineering gives him what he wants. Back of the tallest building that ever graced a metropolitan skyline—back of the smallest item in the Thermoid line of mechanical rubber goods—is the knowledge, skill and experience of a highly specialized engineer.

Thermoid products are produced *for* men who seek new records of accomplishment—and designed *by* men who hold real records for accomplishment. Thermoid belting, hose and packings are engineered for the job—and tested for the job. Each is an engineering achievement worthy of the Thermoid trade-mark only because it is worthy of *your* confidence. *Buy by that quality mark!*

THERMOID RUBBER COMPANY

Factories and Main Offices: TRENTON, NEW JERSEY

Thermoid

BELTING
HOSE and PACKINGS

This is an opportune time to

MODERNIZE YOUR CEMENT PLANT

by the installation of modern economical machinery
and technical improvements in layout and process.

F. L. Smidth & Co. manufacture the following complete line of modern

CEMENT PLANT MACHINERY

UNIDAN three-compartment grinding machine.
UNI-KOM four-compartment grinding machine.
KOMINUTER for wet and dry grinding.
TUBEMILL for wet and dry pulverizing.
TRIX for grading wet granulated material.
COAL MILLS for grinding coal.
SPRAY CASINGS for pulverizers.
CYLPEBS metallic grinding bodies.
DRAGPEB metal lining for pulverizers.
SILEX flint liners for pulverizers.
WASHMILL for distintegrating and mixing materials in water.
AGITATORS for mixing and storing wet composition.

ROTARY KILNS.
UNAX KILNS, rotary kilns with external concentric cooling drums.
UNAX COOLERS for existing kilns.
COOLERS—rotary pressure coolers.
CHAIN SYSTEM for kilns.
KILN CONTROL, electrical.
KILN EQUIPMENT, as hoods, dampers, spouts, airseals, dust chambers.
MOLER insulating bricks for kilns, etc.
COAL FEEDERS for rotary kilns.
COAL BURNERS for rotary kilns.
GAS BURNERS for rotary kilns.
OIL BURNING EQUIPMENT for rotary kilns.

FLUXO PUMP for pneumatic transport.
FLUXO PACKER for filling bags.
EXBINER for discharging bulk cement.
SKIPULTER shaker conveyor.
CYLCUP distributing conveyor.
SLURRY FEEDERS for kilns and mills.
CRADLE FEEDERS for crushed coal, rock, clinker, etc.
TABLE FEEDERS for coal, rock, clinker, etc.
PUMPS for cement slurry.
SYMETRO Drives, speed reduction units.
LENIX short center belt drive.
FLOURMETER for determining micron sizes in finely ground cement, etc.

In addition, F. L. Smidth & Co. are engineer specialists in designing and equipping factories for making portland cement, having devoted their efforts exclusively to this industry for a period of fifty years.

Their engineering services include all stages of the project from the preliminary investigation of the site and raw material deposits, chemical and physical tests of the raw materials and finished cement, to all necessary drawings and specifications for erecting and equipping all departments of the plant, including also the electrical engineering.

This service applies equally well to complete new plants or any special department of a plant—to revisions or conversions of existing plants—making standard portland cement, slag cements, white cement, or for making special high early strength cements, such as "VELO."

F. L. SMIDTH & CO.

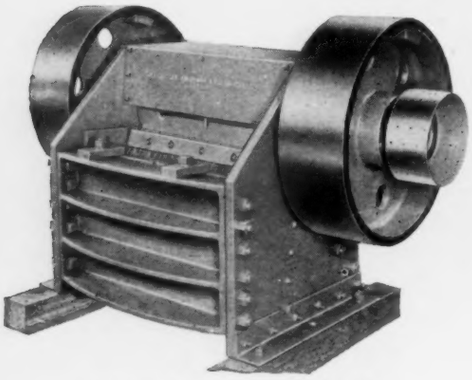
225 BROADWAY NEW YORK, N. Y.

GRUENDLER

Rock and Gravel Crushing and Screening Plants

Stationary, Semi-portable and Full-portable to Meet Any Situation

Large road program calls for greater quantities of fine aggregate. GRUENDLER roller-bearing, all-steel jaw crusher and heavy duty hammer crushers are leaders

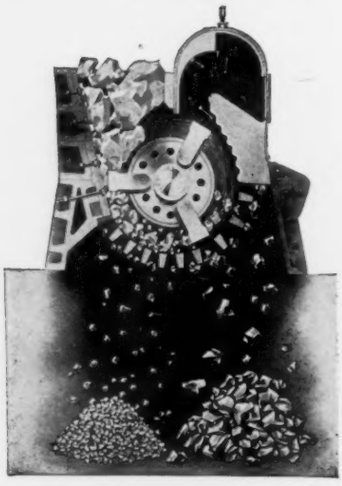


Roller Bearing Jaw Crusher

in the field of reduction, uniformity and lowest cost per ton.

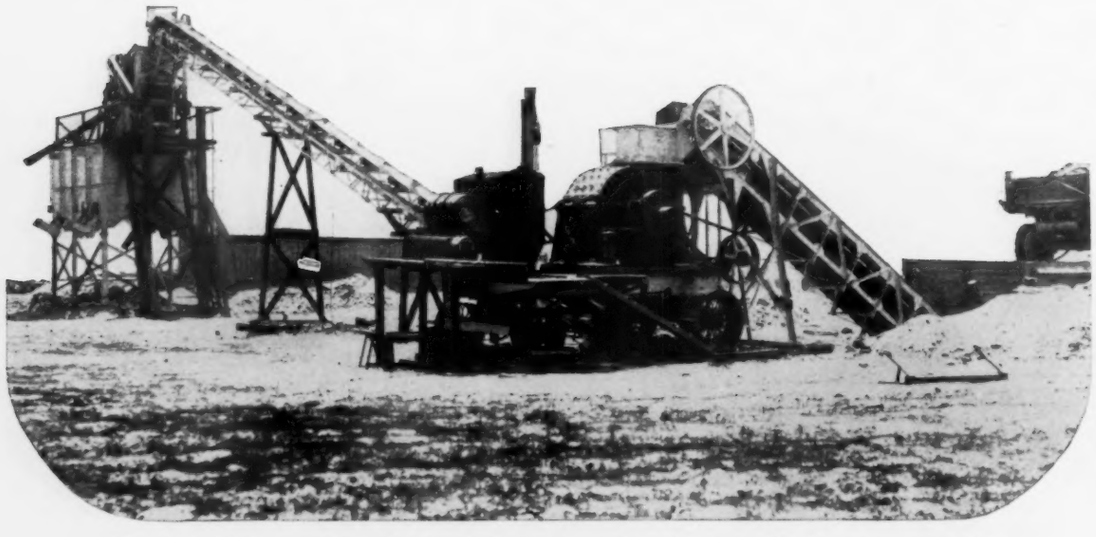
Primary jaw, Blake type, plain bearing—24x36. Roller bearing overhead eccentric—15x20, 15x36. Roller bearing, fine reductions—10x20, 10x30, 10x36, 10x40. Roller bearing hammer crusher, one reduction, from 4″ to 1/4″ material.

No matter whether plant desired is for 100 tons daily or 4,000 tons daily, GRUENDLER can meet the requirements with most exacting equipment and modern design plant.



Heavy Duty Hammer Crusher

Manufacturers of:
Jaw and hammer crushers, elevators, revolving screens, shaker screens, conveyors, bin gates, quarry cars, rock feeders, pan conveyors, transmission machinery and steel bins.



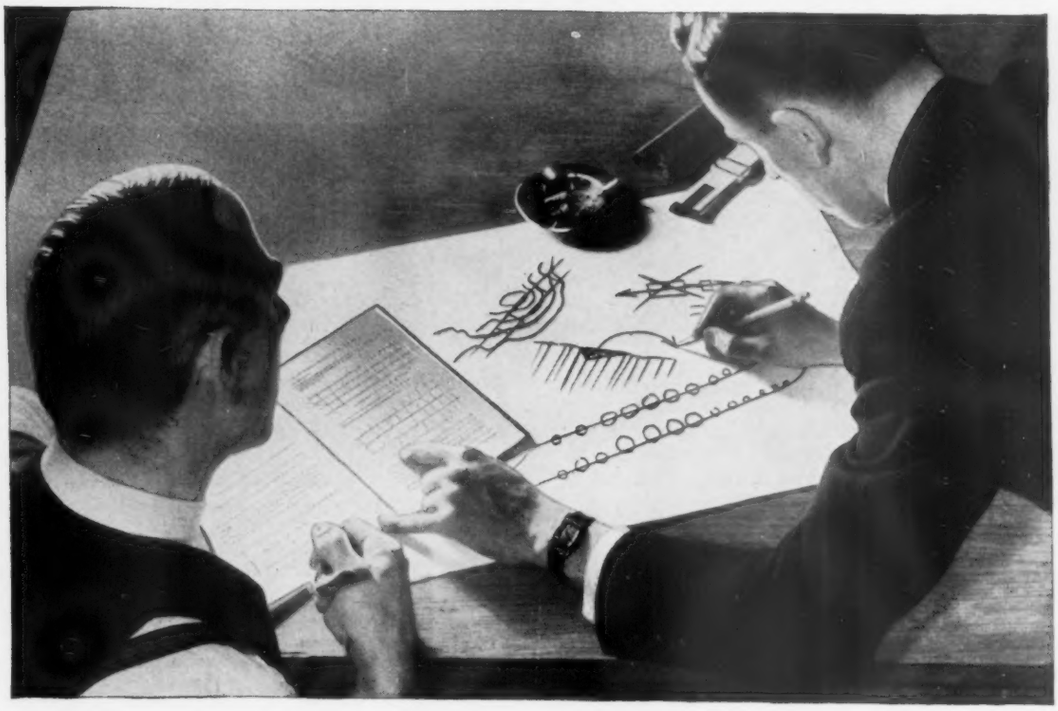
Semi-portable crushing plant—1200 tons per day 3″, and 400 tons per day 3/4″ aggregate material. One reduction.

• Get More Details •

GRUENDLER CRUSHER & PULVERIZER CO.

Established 1885

Dept. P&Q, 2915 N. Market Street **St. Louis, Missouri**



He saw the point . . . . .

and Cordeau gave him an extra profit

On a highway job, about six miles outside of Wilkes-Barre, Pa., the grade called for a heavy side cut about 400 yards long, containing 11,760 cu. yds. of rock. Contour of the ground sloped to the west, and the problem was to load and fire the shot so as to remove as much material as possible in this direction, and avoid handling.

Drilling was continued until a total of 1,186 holes had been made. There were 121 6″ well drill holes averaging 24 ft. deep; 469 2½″ wagon drill holes averaging 6 ft. deep; and 596 jackhammer holes averaging 6 ft. deep. A total of 23,750 lbs. of powder was used, and the hook-up required 15,000 feet of Cordeau-Bickford Detonating Fuse.

A perfect shot was obtained. Approximately 5,000 cu. yds. of rock was lifted clear of the right of way and deposited over the lower slope. This fact in itself was a big saving, justifying the use of Cordeau. In addition, however, was the fact that the shovels, air compressors, drilling equipment, pipe lines, tractors, etc., which under the old plan of three blasts would have had to be removed *three* times, were able to remain in place until the one giant blast was ready.

Only with Cordeau-Bickford Detonating Fuse would a giant blast such as this be practicable. The *extra* profit was therefore due to the use of Cordeau. The Ensign-Bickford Company, Simsbury, Conn.

CB25

A new technique in blasting that is saving thousands ofdollars for quarry men and contractors everywhere. Free to executives.

CORDEAU
DETONATING FUSE
BICKFORD

THE 1934 HANDBOOK WILL BE READY SOON

How—

—much do you know about your prospects
—accurate and complete are your prospect lists
—many "not there" calls do your men make
—much do you waste per year on poor lists
—much do you know about new developments

?

The pit and quarry industries are more active now than they have been in years. In fact, it's one of the most active fields in industry. It's natural. For before the roads, dams, bridges, buildings, etc., can be built under the public works program the raw material has to be furnished.

Get your share of it. Don't miss fire with poor prospect lists. Don't lose sales because you had "never heard of that fellow before."

These lists are the most complete ever published. They contain hundreds of new names. They have been completely revised—all listings have been brought up to the minute.

Regardless of whether your territory covers only one state or the whole country the investment in a copy of Pit and Quarry Handbook is something that will pay big dividends—in sales.

Get Started Now—The Field Is ACTIVE—It Is BUYING—Order This Selling Helper Today

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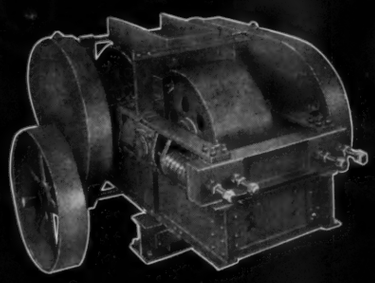
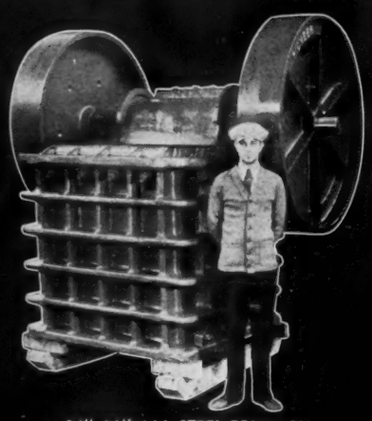
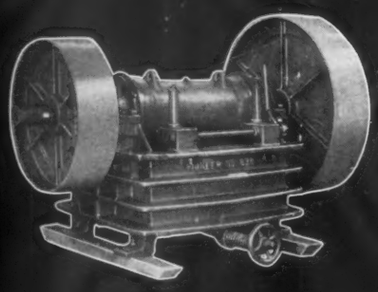


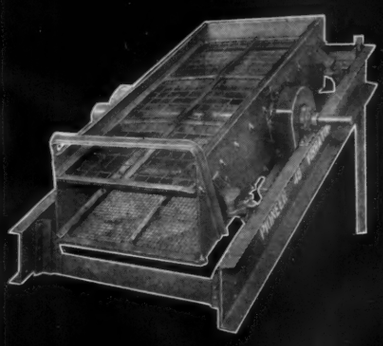
20"x40" ANTI-FRICTION BEARING ROLL CRUSHER
For fast reduction—takes materials up to 4" and reduces by 2" stages. Roll Crushers also made in 14"x24" and 18"x24" sizes.



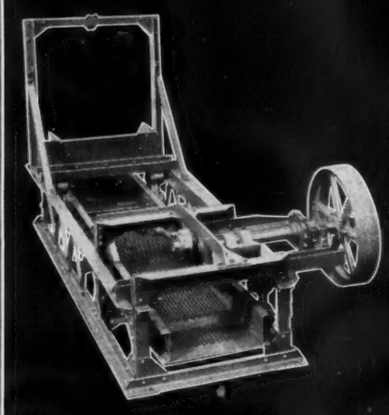
24"x36" ALL STEEL PRIMARY CRUSHER
Force feed lubrication—Overhead Eccentric—Enclosed Worm Gear Adjustment. Maximum discharge opening 6"—minimum 3".



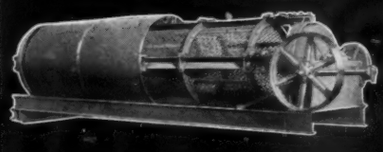
836 ANTI-FRICTION BEARING JAW CRUSHER
Self-aligning SKF Bearings—with Patented Dust Proof Closures. Made in following sizes: 818, 824, 836, 1036 and 1536.



No. 48 VIBRATOR SCREEN
Positive drive—anti-friction bearing type. Made in 6 sizes—2'x4' to 4'x8'.



PIONEER SHAKER SCREEN
To meet strict tolerance. Plain or anti-friction types in six sizes.



HEAVY DUTY REVOLVING SCREEN
With Sand Jacket
A complete line of standard and heavy duty revolving screens, may be equipped with Scrubber and—or Sand Jacket.

PIONEER

Offers You { QUALITY ECONOMY RELIABILITY

IN THEIR COMPLETE LINE OF

ROCK AND GRAVEL EQUIPMENT

CRUSHERS Special features of Pioneer Crushers include a positive adjusting mechanism, enclosed dust proof worm gear, Chrome Nickel heat treated shaft, machined and ground, and dust proof cover over push and pull wedges. The base and pitman are of Carbon Electric Steel, heat treated, with manganese steel jaws.

CONVEYORS Built in four sizes of plain bearing conveyors—16 inch, 18 inch, 24 inch and 30 inch. Anti-friction bearing Conveyors, three sizes—18 inch, 24 inch and 30 inch. Frames are steel lattice type construction offering greatest strength with lightest weight. Also units in plain bearing or antifriction bearings for wood frame conveyors.

SCREENS Vibrator Screens for large capacities on material from No. 3 mesh down to dust are positive action, anti-friction bearing type, with self-aligning SKF bearing dirt proof housings and adjustable screen pan.

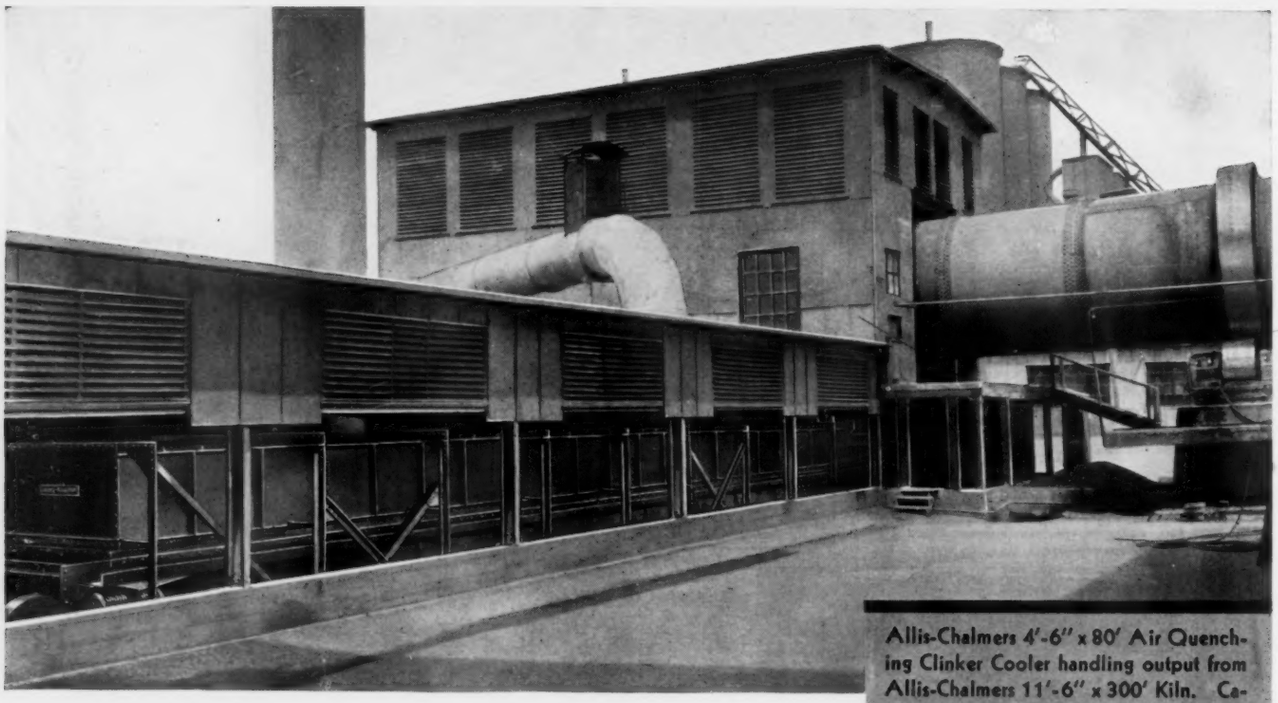
Shaker Screens are recommended where close tolerances are required, are equipped with SKF bearings in the crankshaft and hanger assemblies; enclosed water proof and dust proof wrist pins are standard equipment.

Revolving Screens for scalping and washing, are rigid in construction, built in sizes from 30 inch to 48 inch with or without sand jackets or scrubbers.

We have a staff of experienced field engineers who are at your service. May we serve you?

PIONEER GRAVEL EQUIPMENT MANUFACTURING COMPANY

1519 Central Avenue Minneapolis, Minnesota



Allis-Chalmers 4'-6" x 80' Air Quenching Clinker Cooler handling output from Allis-Chalmers 11'-6" x 300' Kiln. Capacity 140 bbls. per hr. Clinker discharge temperature averaging less than 25° F higher than air used for cooling.

A New Type Cooler..

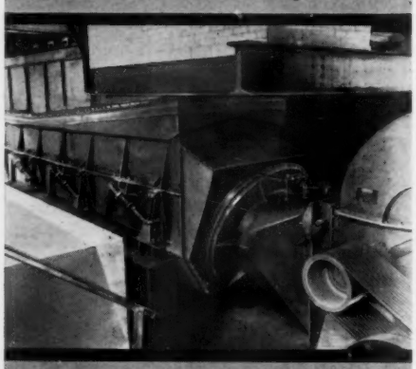
to Aid in Producing Better Cement at Lower Cost

PROGRESSIVE grinding Compeb mills with air separation and kilns with enlarged calcining zones were Allis-Chalmers' contributions toward producing better cement at lower cost. A third step has been made with a new type cooler.

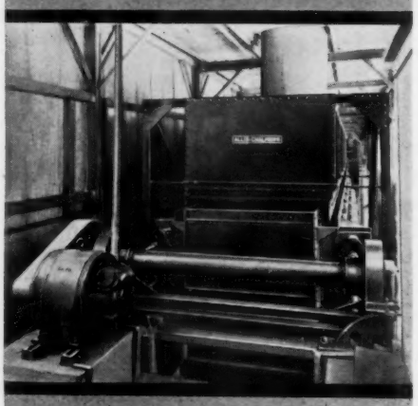
Allis-Chalmers has developed and placed in commercial operation a Shaking Type Air Quenching Cooler having radical advantages over the usual rotary type. The clinker falls directly from the rotary kiln on to a shaking grate which forms a conveying surface. Cooling air from a duct below passing up through the agitated bed of hot clinker results in a very rapid exchange of heat from the clinker to the air. The recuperated heat is returned to the process with the primary and secondary air used for combustion in the kiln.

Besides cooling the clinker and saving fuel by recuperating most of the sensible heat, grinding costs are considerably reduced due to easier grindability of air quenched clinker. The cement produced has a more uniform and higher early strength. Power required to operate the shaking element of this new cooler and the fan for supplying cooling air, is considerably less than for a rotary cooler installation.

If interested in producing better cement at lower cost write the nearest Allis-Chalmers sales office or the main office at Milwaukee.



Feed End of Air Quenching Clinker Cooler.



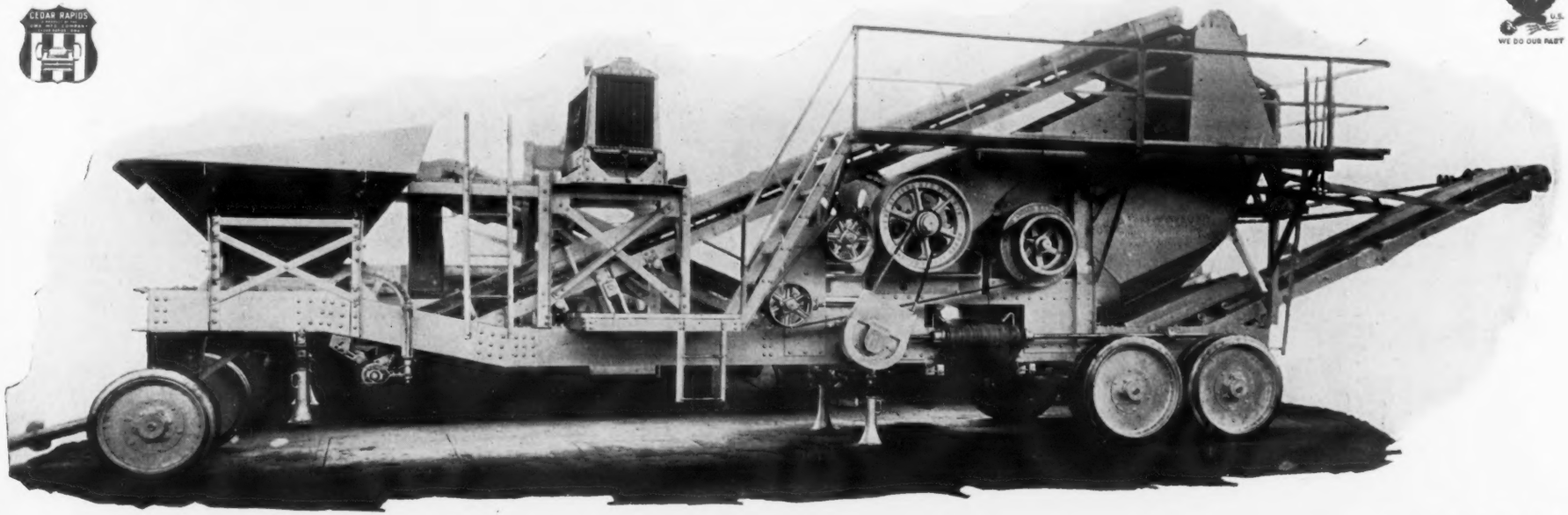
Discharge End of Air Quenching Clinker Cooler.

ALLIS-CHALMERS

Allis-Chalmers Manufacturing Company, Milwaukee

A Masterpiece of Portable Gravel Equipment

The Finest Portable Rock and Gravel Plant on the Market



Outstanding Features

Low Feeding Hopper
Elimination of Costly Setup Time
Large Capacity
Low Overall Height
Flexibility—For Either Gravel or Rock
Low Unit Costs
Centralized Controls
and Many Others

The "Cedar Rapids" Straight Line Tandem Vibrator Plant

We Solicit Your Inquiries

Iowa Manufacturing Company

Originators of the Straight Line Portable Plant

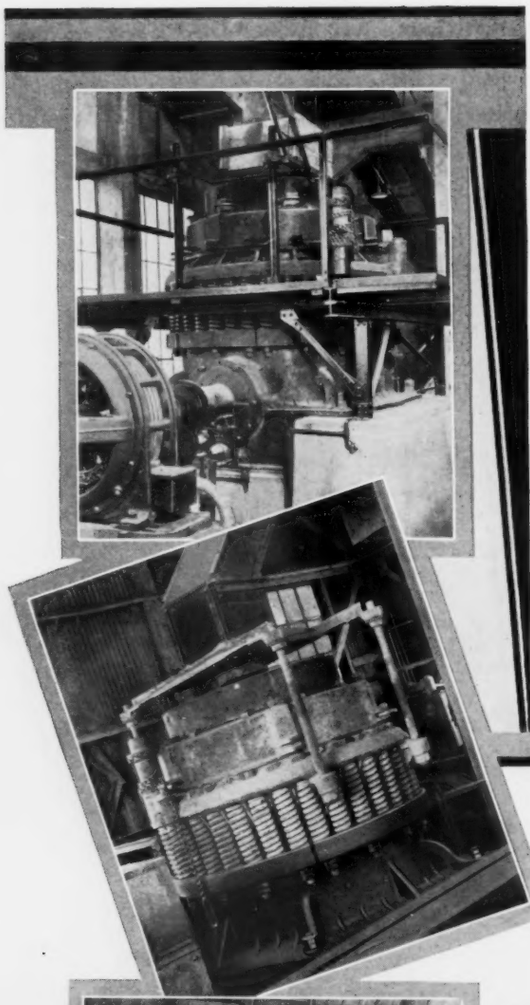
CEDAR RAPIDS, IOWA

Types Available

Single or Tandem Rear Axles
Single or Dual Crushers
1436 Primary Crusher
Trap or Shovel Feed
Sand Eliminator
Solid or Pneumatic Tires
With or Without Power
Extended Feed Conveyor
For Under Primary Breaker

ORE—SLAG—STONE—GRAVEL

Finer Crushing—Greater Capacity—Lower Cost



WITH the two types of Symons Cone Crushers now available, a ready solution is found to the problem of quantity production of fine product. For the ordinary sizes, there is the Standard Cone; while for the still finer sizes, there is the newer Short Head Cone Crusher.

The Standard Crusher has long demonstrated its advantages in the largest crushing plants the world over. The performance of the Short Head is even more outstanding. In the mining field, it has shown its advantage in producing a superior mill feed, reducing the ultimate crushing cost and improving the recovery. In the non-metallic field, it fills a long felt want for a crusher that will produce road building materials, such as are required for black top and similarly surfaced roads. For finer crushing, one of these crushers will serve you best.

NORDBERG

MFG. CO. MILWAUKEE

NEW YORK
60 East 42nd St.

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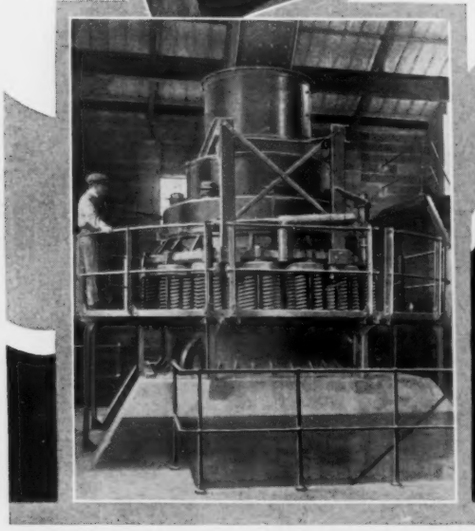
LOS ANGELES
Subway Terminal Bldg.



SYMONS CONE CRUSHERS

Wintry weather need never hinder blasting work

The Public Works Program is under way. Throughout the winter months it will develop with strenuous activity. Ideal explosives are a prime requisite.

ATLAS Explosives in varying strengths and kinds for varying jobs are produced for use under any temperatures which may be encountered under practical working conditions. Thawing should not be necessary when ATLAS is used.

The same features of safety and control that apply in the heat of summer are present in very cold weather when these relatively non-freezing explosives are used.

No Public Works Program need be delayed one minute because of difficulty in using explosives in cold weather—and there is an ATLAS Explosive for every type of work which may be undertaken during winter months. The ATLAS representative will gladly consult with you about any special cold weather blasting problems.

Especially convenient in cold weather—

ATLAS ACCORDION FOLD ELECTRIC BLASTING CAPS

You can easily unfold the Accordion Fold with your mittens on. Handy, safe, convenient—and no snarls to freeze your fingers while unwinding.

ATLAS POWDER COMPANY

A proper explosive for every blasting requirement

WILMINGTON · DELAWARE

Cable Address—ATPOWCO

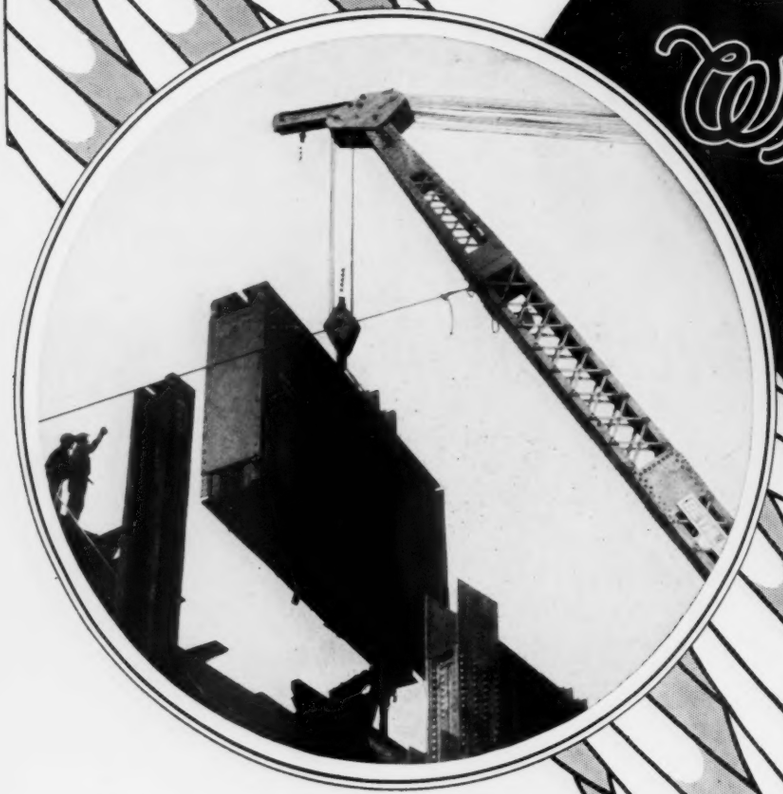
BRANCH OFFICES:

Allentown, Pa.; Boston, Mass.; Denver, Colo.; Houghton, Mich.; Joplin, Mo.; Kansas City, Mo.; Knoxville, Tenn.; Memphis, Tenn.; New Orleans, La.; New York, N. Y.; Norristown, Pa.; Philadelphia, Pa.; Pittsburg, Kansas; Pittsburgh, Pa.; St. Louis, Mo., Tamaqua, Pa.; Wilkes-Barre, Pa.

ATLAS EXPLOSIVES

ATLAS EXPLOSIVES

Williamsport Wire Rope



Will do *that tough job* for You!

When you see engineers, workmen and others gazing breathlessly at a new construction, you know wire rope is in for a tough job.

This 62½ ton Bethlehem steel girder was spotted by a Williamsport wire rope with about the same ease as a regular girder.

We have ropes specially built for long service in quarries and what Williamsport can do in the building industry it can do in pits and quarries.

WILLIAMSPORT
WIRE ROPE COMPANY

Main Office and Works:
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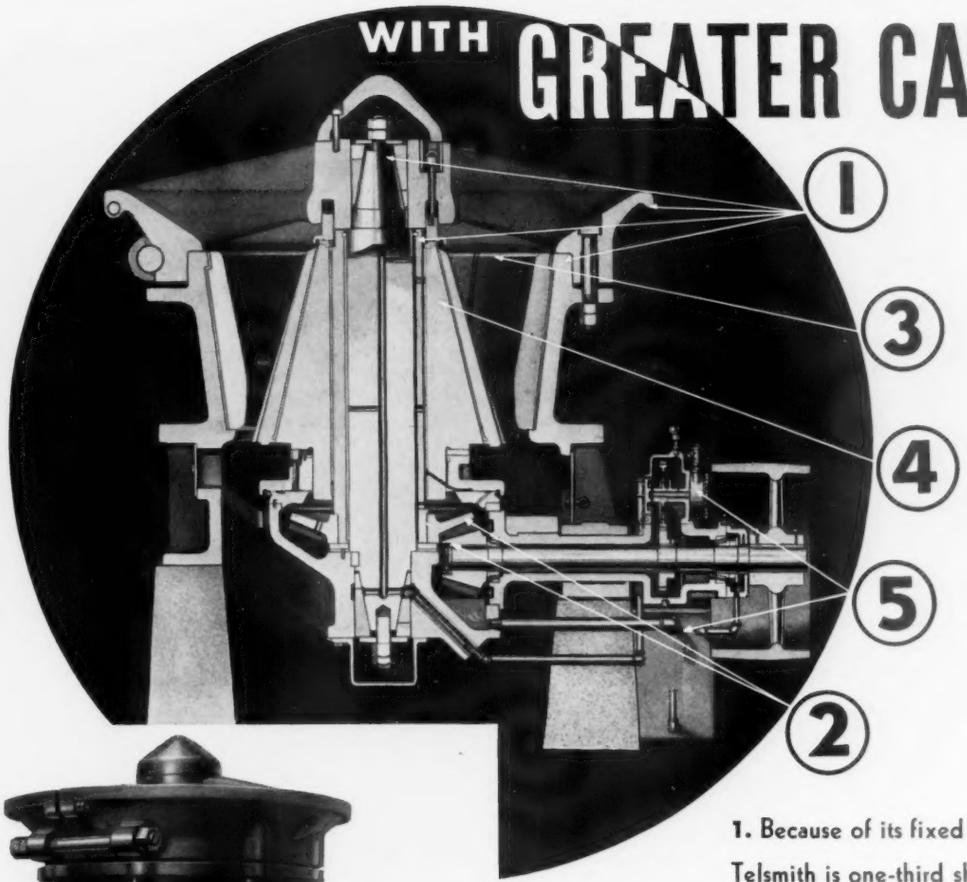
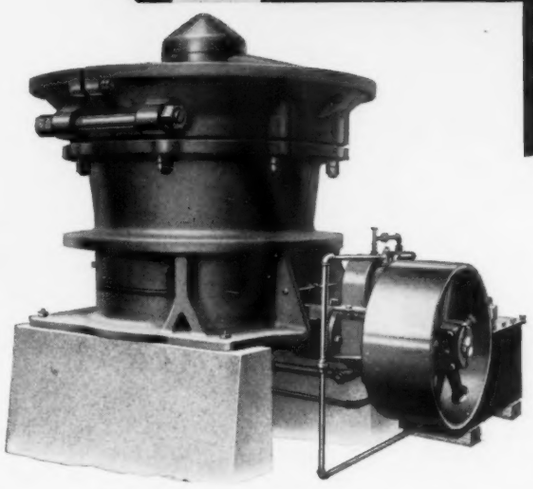
122 So. Michigan Ave., CHICAGO

THE WHY OF TELSMITH'S HIGHER SPEED WITH GREATER CAPACITY





1. Because of its fixed shaft and sleeve eccentric, Telsmith is one-third shorter. This compact structure, steel frame and steel crown give it superstamina to withstand high speeds. **2.** Cut steel drive gears and force feed oiling permit higher eccentric speeds and faster gyration. **3.** Head and concave diameters are larger, with greater receiving and crushing area—allowing faster feeding. **4.** Telsmith's *parallel pinch* starts immediately—stops slippage—crushes full-tilt all the way down—*guarantees bigger capacity.* **5.** Perfect lubrication (with all bearings bathed in clean cool oil) keeps crusher as young, vigorous and effective as an Olympic athlete. • Now—read 'em over—1-2-3-4-5—that's why this crusher works faster—crushes more rock—costs less for doctor bills. • P. S. Frame, crown and main shaft are guaranteed for two years against breakage by tramp iron.

B-28

WRITE FOR BULLETIN C-15

SMITH ENGINEERING WORKS

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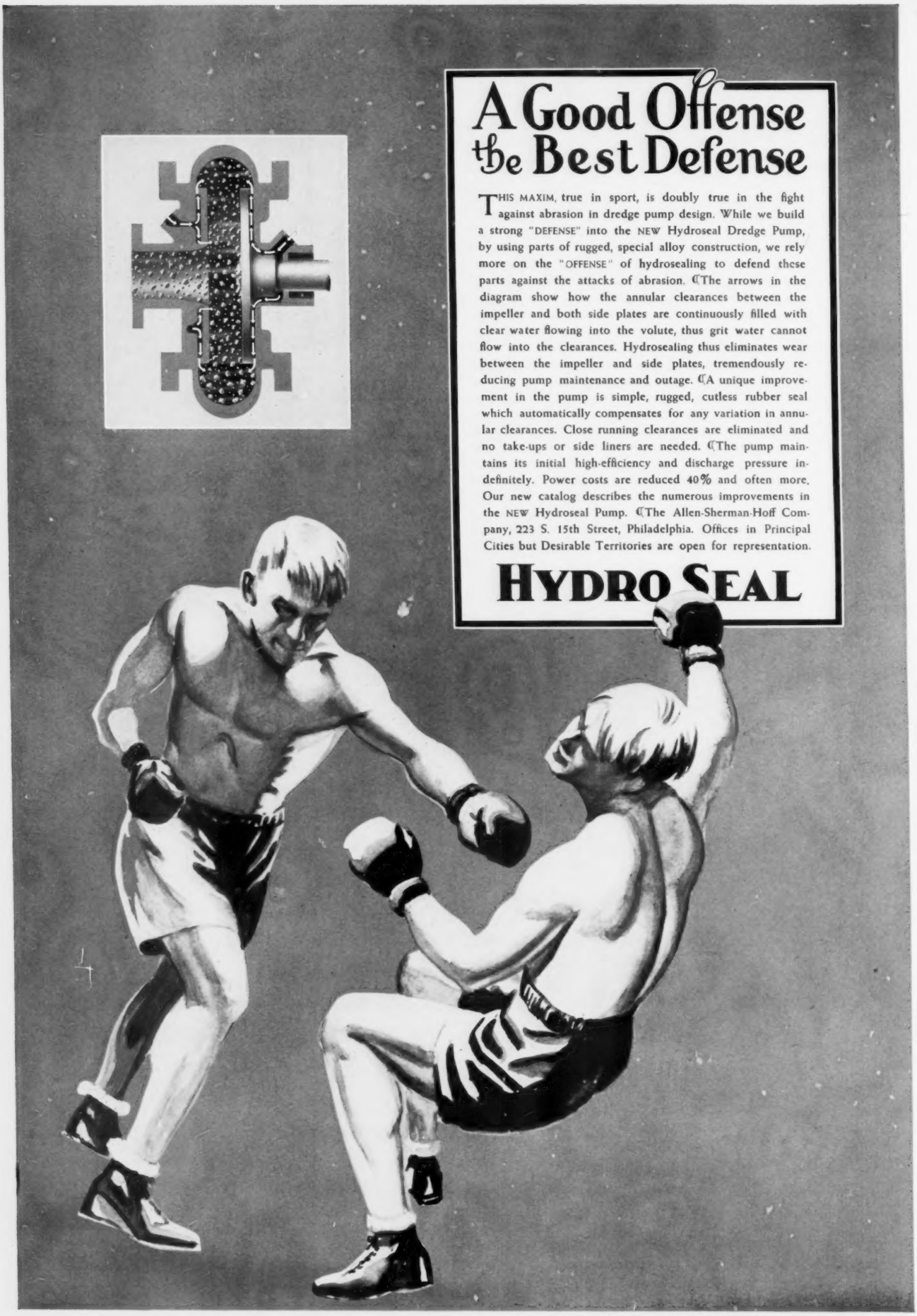
50 Church Street	New York City
211 W. Wacker Drive	Chicago, Ill.
Harrison Bldg.	Philadelphia, Pa.
1109 Statler Bldg.	Boston, Mass.
Clark & Freeland, Inc.	Baltimore, Md.
607 Westinghouse Bldg.	Pittsburgh, Pa.
Victor L. Phillips Co.	Kansas City, Mo.
Brandeis M & S Co.	Louisville, Ky.
J. W. Bartholow Co.	Dallas, Texas

TELSMITH


A Good Offense the Best Defense
THIS MAXIM, true in sport, is doubly true in the fight against abrasion in dredge pump design. While we build a strong "DEFENSE" into the NEW Hydroseal Dredge Pump, by using parts of rugged, special alloy construction, we rely more on the "OFFENSE" of hydrosealing to defend these parts against the attacks of abrasion. ¶The arrows in the diagram show how the annular clearances between the impeller and both side plates are continuously filled with clear water flowing into the volute, thus grit water cannot flow into the clearances. Hydrosealing thus eliminates wear between the impeller and side plates, tremendously reducing pump maintenance and outage. ¶A unique improvement in the pump is simple, rugged, cutless rubber seal which automatically compensates for any variation in annular clearances. Close running clearances are eliminated and no take-ups or side liners are needed. ¶The pump maintains its initial high-efficiency and discharge pressure indefinitely. Power costs are reduced 40% and often more. Our new catalog describes the numerous improvements in the NEW Hydroseal Pump. ¶The Allen-Sherman-Hoff Company, 223 S. 15th Street, Philadelphia. Offices in Principal Cities but Desirable Territories are open for representation.
HYDRO SEAL

VOLUME 26 NUMBER 7

Pit and Quarry

With which is consolidated

CEMENT-MILL & QUARRY

CHICAGO, JANUARY, 1934

64% of PWA Road Work Under Way or Advertised

EMPLOYMENT GIVEN TO 130,045

Progress made on emergency construction of public works highways to January 6, 1934, under the supervision of the U. S. Bureau of Public Roads shows a total of 5,337 projects, estimated to cost $276,197,000, had been advertised for contract or begun by day labor employed directly by the highway authorities. The cost of the day labor projects included in the above is estimated at $20,207,000.

Of the 4,587 projects awarded for construction, 2,865 were under construction on January 6, and 500 were completed. The work under construction, which is estimated to cost $166,576,000, was giving regular employment to 130,045 men. In the whole country, work advertised for contract or started by day labor employed directly by the highway authorities involved 64.4 per cent. of the $400,000,000 provided for public works highways under Sec. 204 of the National Industrial Recovery Act.

Massachusetts Gravel Plant Now in Operation

★ William C. Doherty, Inc., Stoneham, Mass., is reported to have put into operation a new sand and gravel plant at East Woburn. The plant is equipped with modern equipment and has a capacity of 50 tons per hr.

Missouri Gravel Producer Operates Under New Name

The Peck-Thompson Sand & Material Co., Kansas City, Mo., has changed its name to the Peck-Woolf Sand & Material Co. Offices are at 307 Midland Bldg. Officers are: Frank C. Peck, chairman; Frank W. Peck, president and treasurer; William P. Woolf, vice president; Earl E. Woodson, secretary.

Judge Approves Cement Company Dissolution

In an order approving the voluntary dissolution of the Peerless Portland Cement Corp., Detroit, Mich., Judge Thomas J. Murphy of the Circuit Court on Jan. 3 appointed W. C. Russell receiver with authority to proceed with the formation of a new corporation of the same name with a capital stock of $50,000.

Set Hearing to Modify Article XI Cement Code

A hearing to consider proposed modifications of Article XI of the cement industry's code, published elsewhere in this issue, was set for Jan. 15. This article deals with the methods of selling and marketing cement, and defines the terms on which it can be sold to various types of consumers.

Perfects Electric Kiln for Lime Manufacture

It is reported that an electric lime kiln, said to be the first of its kind in this country for the separation of limestone into lime and pure carbon dioxide gas, was put into operation late in Dec. at the plant of the Chemical Lime Co., near Bellefonte, Pa. This kiln represents 6 years of effort on the part of Robt. S. Walker, general manager of the company, who has been granted basic patents on this process.

New Firm Takes Over American Development

The Industrial Minerals & Chemical Co., 6 and Gilman St., Berkeley, Cal., has taken over the business of the American Development Co., Ltd., of the same address. The new company will continue to handle non-metallic minerals and carry on the same line of business, according to E. M. Cantelow, secretary and treasurer. W. S. Cowgill is president of the new company.

Building Sodium Plant Near Great Salt Lake

★ The Salt Lake Sodium Products Co., is erecting a new plant near Salt Lake City, Utah, on the Great Salt Lake, to produce anhydrous sodium sulphate from the glauber salt beds underlying the sands on the shore of the lake. The plant will have a capacity of 25 tons per day and room is provided for expansion.

Cement Plants Reopen to Meet Spring Demand

JANUARY OUTPUT NEAR TOP

With prospects for the coming spring better than in any of the last few years cement plants are operating at a rate which will bring their January operation near the peak years. Many plants have shut down and then reopened to stock up material for the expected rush. Others are running through the winter at reduced capacity in order to keep as many employees working as possible.

Plants which went into operation recently include the Colorado Portland Cement Co., Boettcher, Colo.; the North American Cement Co., Security, Md.; Pennsylvania - Dixie Cement Corp., Kingsport, Tenn., and Valley Junction, Ia.; Keystone Portland Cement Co., Bath, Pa.; Edison Portland Cement Co., New Village, N. J.; Northwestern States Portland Cement Co., Mason City, Ia. Plants scheduled to go into operation soon include the North American Cement Corp., Alsen, N. Y., and the Lehigh Portland Cement Co., Metalline Falls, Wash.

Illinois Gravel Plant Now Under Construction

★ It is reported that the Salton Sea Chemical Co., Brawley, Cal., will soon begin the construction of a dry ice manufacturing plant to cost $75,000. A pipe line for natural gas is now under construction. Carl Einhart is general manager.

Gravel Producer Changes Offices and Sales Policy

The St. Louis Material & Supply Co., producers of sand and gravel and manufacturers of California stucco, has moved its main offices from 314 North Fourth Street, St. Louis, to 7409 Forsythe Boul. According to O. S. Conrades, president of the firm, the company has amended its policy and will in the future discontinue its retail business and devote sales promotional efforts solely in the wholesale field. As a means of getting the new policy to the attention of retailers in the St. Louis area the company was host at a Dealers' Dinner on Sat., Dec. 30.

Ready-Mixed Concrete Code Approval Near

AGREES WITH AGGREGATE CODE

Unless some new and unexpected question is raised before the National Recovery Administration on the Code of Fair Competition for the ready-mixed-concrete industry, mixers over the country will be working under their new code by Jan. 15, 1934.

It is stated at the office of Deputy Administrator Ralph Fogg, in which the code is being handled, that practically every question at issue has been settled, and that its provisions are now satisfactory to all concerned.

The code is now in the legal division and every possible effort is being made, in the present congested state of this branch of the N.R.A., to give it final study and send it to Gen. Johnson at once.

The chief handicap in reaching an agreement on the code, which was submitted Aug. 11, revised Sept. 18, and upon which hearings were held Oct. 26, has been due to the attempt to make it harmonize with the code of the crushed-stone, sand-and-gravel, and slag industries for workers generally, including truck drivers.

The mineral-aggregates code was approved by the president Nov. 10 and is now in effect. It provides a 40-hr. week, with minimum wages varying from 40 c. per hr. in the northern states to 25 c. per hr. in the South, with an intermediate zone that carries 30 c. per hr. For certain classes of employees, comparatively few in number, such as drivers, a maximum 48-hr. week is permitted, and this has also been provided in the concrete-mixers' code.

It has been found that little can be done about small concerns that are inclined to cut rates, but since this number is appreciably small, the general impression in N. R. A. circles is that, with the influence of the N. R. A. being felt in all lines of industry, they will soon be complying with the terms of the code.

Almost all the conferences with assistants to Deputy Administrator Fogg are being held by Stanton Walker, engineer of the National Ready Mixed Concrete Assn., and he expresses himself as well pleased with the status of the code. Mr. Walker has been extremely anxious to get the code cleared through the N. R. A. before the building season opens in January.

Oklahoma Cement Plant Erecting Clinker Storage

★ Construction is now under way on a new $35,000 clinker storage building at the plant of the Dewey Portland Cement Co., Dewey, Okla., according to D. M. Tyler, a vice president of the company and manager of the plant. The building will be of all-steel construction with a corrugated metal exterior and is 80 ft. wide by 200 ft. long and 85 ft. high. The superstructure will support an overhead traveling crane which will handle the clinker to and from storage. The building will be completed about Feb. 15, at which time the plant is expected to be operating at full capacity.

A.S.T.M. Moves to New Philadelphia Quarters

Headquarters of the American Society for Testing Materials have been moved from the Engineers' Club Bldg., 1315 Spruce Street, Philadelphia, Pa., to more adequate offices in the Atlantic Bldg., 260 S. Broad Street in the same city. The present offices have been occupied for the past 14 years.

Eastern Slate Plant Is Destroyed by Fire

A fire, believed to have been of incendiary origin, recently destroyed the slate mill of the Bolger-Heller Co., Wind Gap, Pa. Damage is estimated at $100,000. Officials of the company state that rebuilding of the plant will begin as soon as possible.

Univ. of Calif. to Carry on Cement Investigation

The Santa Cruz Portland Cement Co., San Francisco, Cal., recently donated $11,000 to the University of California to be used for an investigation of mortars and concretes containing high-silica cement. These investigations are being carried on in the college of engineering under the direction of Prof. R. E. Davis who will make a report of the findings at the 1934 convention of the American Concrete Institute.

Sturgeon Bay Co. Lands Large Government Order

The Sturgeon Bay Co., Sturgeon Bay, Wis., through E. E. Holsinger, ass't general manager, announces that it has received a contract for about 430,000 tons of stone to be used for the construction of breakwaters at Indiana Harbor, Ind., and Port Washington, Wis.

New York Crushed Stone Plant Sold at Auction

The real and personal property of the bankrupt Plattsburgh Limestone Co., Plattsburgh, N. Y., was recently sold at public auction to the Champlain Valley Oil Co., through its president, Roswell A. Sharron of that city, for $67,000. Mr. Sharron states that his company contemplates considerable improvements to the plant and plans to handle additional road-building materials.

★ Meeting Competition by *Beating It!*

Items in these pages marked with a star call attention to those alert producers who are awake to the arrival of an era of good business and who are expressing their faith in the future by buying and installing their needed equipment NOW.

★ The Colloidal Plant Foods Co., Inc., headed by J. M. Woods, Henderson, Tex., plans to use the sulphur ore found in northern Reeves and Culbertson counties as an ingredient in a commercial brand of soil restorer. Machinery is now being moved to the site of the deposit, about 20 mi. west of Orla, Tex.

★ ★ ★

★ The San Antonio Portland Cement Co., San Antonio, Tex., is installing a complete Northern Blower Co. dust-collecting system in the kiln room and clinker-handling department of its plant.

★ ★ ★

★ The Silver Hill Sand & Gravel Co., 400 Equitable Bldg., Baltimore, Md., has leased property at Silver Hill, Md., and has already laid the foundation for a 125-ton per hr. capacity sand and gravel plant. Officers of the company are: A. T. Carozza, pres.; Frank L. Carozza, vice pres.; C. W. Tailor, secretary.

★ ★ ★

★ An installation of a new Northern Blower Co. dust collecting system has just been completed in the new storage and packing plant of the Huron Portland Cement Co. at Oswego, N. Y.

★ ★ ★

★ The Pearis Island Sand Co., began operations recently at its new sand and gravel plant on an island in the New River near Pearisburg, Va. The plant is owned in part by M. T. Epling.

★ ★ ★

★ It is reported that the McGrath Sand & Gravel Co., Chillicothe Ill., has started construction on a new sand and gravel crushing and screening plant on Beebe Island near Lewiston, Ill. Equipment is now being installed.

★ ★ ★

★ It is reported that a new and modern sulphur refinery has been put into operation at Venado, San Luis Potosi, Mexico, by Mexican interests. The plant is producing about 900 tons daily of 99.8 per cent. pure sulphur.

5th Region Completes Its Code Organization

COMMITTEE HEADED BY WESTON

Producers of mineral aggregates in the Region 5 (Alabama, Florida, Georgia, Mississippi and South Carolina) have completed the following organization. The report was received too late to be included in the complete report of all other regions published elsewhere in this issue.

REGIONAL COMMITTEE
(*Indicates member of Executive Committee.)

Crushed Stone:
G. A. Austin, Consolidated Quarries, Atlanta, Ga.
R. D. Beatty, Dolcito Quarry Co., Birmingham, Ala.
*E. F. Fitch, Florida Crushed Stone Co., Jacksonville, Fla.
C. M. Lyle, C. M. Lyle Construction Co., Gainesville, Ga.
J. W. Waldron, Naranja Rock Co., Inc., Naranja, Fla.
George D. Lott, Palmetto Quarry Co., Columbia, S. C.
*T. I. Weston, Weston & Brooker Co., Columbia, S. C. (Chairman of committee)

Sand and Gravel:
George Denham, Concrete Gravel Co., Columbus, Miss.
T. S. Baker, Diamond Interlachen Sand Co., Jacksonville, Fla.
C. F. Mullen, Georgia Gravel Co., Columbus, Ga.
W. R. Bonsal, Lawrence Stone & Gravel Co., Raleigh, N. C.
*J. D. Roquemore, Roquemore Gravel & Slag Co., Montgomery, Ala.
H. G. Boyd, Southern Sand & Gravel Co., Selma, Ala.
S. H. Livingston, Southern Sand & Gravel Co., Columbus, Miss.

Slag:
G. C. McCullough, Birmingham Slag Co., Birmingham, Ala.
*C. A. Barinowski, Birmingham Slag Co., Birmingham, Ala.
C. E. Ireland, Birmingham Slag Co., Birmingham, Ala.
C. B. Ireland, Montgomery Gravel Co., Birmingham, Ala.
E. C. Catts, Roquemore Gravel & Slag Co., Montgomery, Ala.
L. E. Willson, Spruce Pine Sand Co., Sheffield, Ala.
*G. A. Mattison, Jr., Woodstock Slag Corp., Birmingham, Ala.

ALABAMA STATE COMMITTEE

Stationary Plants:
C. B. Ireland, Birmingham Slag Co., Birmingham, Ala. (Secretary *pro tem* of committee)
L. E. Willson, Tennessee Valley Sand & Gravel Co., Sheffield, Ala.
Geo. A. Mattison, Jr., Woodstock Slag Corp., Birmingham, Ala. (Chairman of committee)

Portable Plants:
G. K. Little, Baker Tow Boat Co., Tuscaloosa, Ala.
A. V. Littrell, Littrell Construction Co., Decatur, Ala.
J. B. Patterson, Lacon, Ala.

Seventh Member:
Hugh White, Alabama Public Service Co., Montgomery, Ala.

FLORIDA STATE COMMITTEE

Stationary Plants:
T. S. Baker, Diamond Interlachen Sand Co., Jacksonville, Fla.
E. F. Fitch, Florida Crushed Stone Co., Jacksonville, Fla.
C. F. Mullen, Florida Gravel Co., Chattahoochee, Fla.

Portable Plants:
C. C. Blake, Miami Rock Co., Miami, Fla.
(Two other members to be chosen.)

Seventh Member:
(To be elected.)

GEORGIA STATE COMMITTEE

(Four stationary-plant members have been reported as elected although committee should contain only three. One of those listed will probably be eliminated later.)

Stationary Plants:
J. W. Herman, Jr., Atlanta Sand & Supply Co., Atlanta, Ga. (Secretary of committee)
S. K. Davidson, Sr., Davidson Granite Co., Lithonia, Ga.
E. A. Dawes, Dawes Silica Mining Co., Thomasville, Ga. (Chairman of committee)
L. J. Backus, Ladd Lime & Stone Co., Cartersville, Ga.

Portable Plants:
R. D. Smith, Georgia Sand & Gravel Co., Columbus, Ga.
W. Norris Harris, S. E., Atlanta, Ga.
Charlie Lyle, C. M. Lyle Construction Co., Gainesville, Ga.

Seventh Member:
F. B. Jamison, Atlanta Sand & Supply Co., Atlanta, Ga.

MISSISSIPPI STATE COMMITTEE

Stationary Plants:
C. F. Harris, Columbus Gravel Co., Columbus, Miss.
E. J. Traxler, Crystal Springs Sand & Gravel Co., Crystal Springs, Miss.
L. T. McCourt, Greenville Sand & Gravel Co., Greenville, Miss.

Portable Plants:
Frank Fleming, Columbus, Miss.
H. Green, Green Bros. Gravel Co., Picayune, Miss.
(One more to be elected.)

Seventh Member:
(To be elected.)

SOUTH CAROLINA STATE COMMITTEE

Stationary Plants:
D. E. Saunders, South Carolina Granite Co., Columbia, S. C.
J. Erlich, Southern Silica Mining & Mfg. Co., Columbia, S. C.
John Wilson, S. W. Wilson & Sons, Inc., Columbia, S. C.

Portable Plants:
(Three members to be elected.)

Seventh Member:
(To be elected.)

ALABAMA DISTRICT COMMITTEE

Crushed Stone:
R. D. Beatty, Dolcito Quarry Co., Birmingham, Ala. (Chairman of committee)
A. V. Littrell, Littrell Construction Co., Decatur, Ala.
J. B. Patterson, Lacon, Ala.

Sand and Gravel:
R. N. Hawkins, Kirkpatrick Sand & Gravel Co., Birmingham, Ala.
J. D. Roquemore, Roquemore Gravel & Slag Co., Montgomery, Ala. (Vice-chairman of committee)
L. E. Willson, Tennessee Valley Sand & Gravel Co., Sheffield, Ala.

FLORIDA DISTRICT COMMITTEE

Crushed Stone:
J. Y. Clarke, Jr., Crystal River Rock Co., Leesburg, Fla. (Secretary-treasurer of committee)
S. L. Kilgore, Florida Crushed Stone Co., Inc., Leesburg, Fla. (Chairman of committee)
W. T. Price, W. T. Price, Inc., Miami, Fla.

Sand and Gravel:
C. F. Mullen, Florida Gravel Co., Chattahoochee, Fla.
T. S. Baker, Diamond Interlachen Sand Co., Bartow, Fla.
C. C. Blake, Miami Rock Co., Miami, Fla.

Slag:
William Day, Birmingham Slag Co., Orlando, Fla.
C. E. Ireland, Birmingham Slag Co., Birmingham, Ala.
George A. Mattison, Jr., Woodstock Slag Co., Birmingham, Ala.

GEORGIA DISTRICT COMMITTEE

Crushed Stone:
M. W. Kirkman, Consolidated Quarries Corp., Atlanta, Ga. (Secretary-treasurer of committee)
Robert Underwood, Pine Mountain Granite Co., Lithonia, Ga.
T. I. Weston, Weston & Brooker Co., Columbia, S. D.

Sand and Gravel:
M. A. Jamison, Atlanta Sand & Supply Co., Atlanta, Ga. (Chairman of committee)
J. H. Brown, Brown Bros., Junction City, Ga.
M. D. Avirett, Georgia Gravel Co., Columbus, Ga.

Slag:
C. E. Ireland, Birmingham Slag Co., Birmingham, Ala.
E. C. Catts, Roquemore Gravel & Slag Co., Montgomery, Ala.
G. A. Mattison, Jr., Woodstock Slag Corp., Birmingham, Ala. (Vice-chairman of committee)

MISSISSIPPI DISTRICT COMMITTEE

Sand and Gravel:
P. M. Hollis, Amory Concrete Gravel Co., Amory, Miss.
Geo. H. Smith, Gatesville Gravel Co., Jackson, Miss. (Secretary of committee)
Herbert Gillis, Hattiesburg Gravel Supply Co., Hattiesburg, Miss. (Chairman of committee)
J. S. Cooper, Memphis Stone & Gravel Co., Memphis, Tenn.
C. B. Ireland, Montgomery Gravel Co., Birmingham, Ala.
Ray M. Waters, Waters & McCrary Gravel Co., Columbus, Miss.

Slag:
C. A. Barinowski, Birmingham Slag Co., Birmingham, Ala.
C. E. Ireland, Birmingham Slag Co., Birmingham, Ala.
George A. Mattison, Woodstock Slag Corp., Birmingham, Ala.
John Phillips, Woodstock Slag Corp., Birmingham, Ala.

SOUTH CAROLINA DISTRICT COMMITTEE

Crushed Stone:
R. S. Campbell, Holston Quarry Co. of South Carolina, Knoxville, Tenn.
G. D. Lott, Palmetto Quarries Co., Columbia, S. C. (Chairman of committee)
D. E. Saunders, South Carolina Granite Co., Columbia, S. C.

Sand and Gravel:
R. L. Kerr, Jr., William M. Bird & Co., Columbia, S. C.
W. R. Bonsal, Lawrence Stone & Gravel Co., Raleigh, N. C.
John Wilson, S. W. Wilson & Sons, Inc., Columbia, S. C. (Secretary of committee)

Slag:
C. A. Barinowski, Birmingham Slag Co., Birmingham, Ala.
C. E. Ireland, Birmingham Slag Co., Birmingham, Ala.
G. A. Mattison, Woodstock Slag Corp., Birmingham, Ala.

Mathieson Alkali Co. Plans $5,000,000 Project

$777,000 STONE PLANT INCLUDED

★ The Mathieson Alkali Works, Inc., New York, N. Y., has authorized construction of the following new plants on a 1,000-acre tract near Lake Charles, La.: limestone plant, $777,000; soda ash plant, $2,182,000; caustic soda works, $870,000; power plant, water works, pipe line, etc., $940,000; brine supply and pipe line, $545,000. The Stone & Webster Eng. Corp., New York, will supervise construction.

★ The Columbia Quarry Co., St. Louis, Mo., is reported to have put a new gasoline-powered clamshell crane into operation at its new plant at Chester, Ill.

Editorial

What's New in The "New Deal?"

THERE are a great many people in whom the mere mention of the word "new" erects a wall of stubborn opposition. To them anything that has not been tried is anathema; they are willing to stand or fall in their adherence to the "good old" ways. In matters of morals they call the new generation the worst; in mechanics they hold the methods of their grandfathers supreme; in politics they will have nothing that was not approved by the framers of the constitution; in science their court of appeals is the Old Testament; in economics *laissez faire* is their god. It is a common human trait, this detestation of the new. Missionaries found it among the savages and laughed; we find it among business men of all classes and look puzzled; Henry Ford discovered it even among engineers, those men who, of all the world, should be the most receptive of new ideas.

One may say in utter frankness that one of the principal grounds of objection to the "new deal" is its supposed newness. The very adjective that recommended it to those who elected its sponsor damned it with equal effectiveness among those who did not. While it raised hopes and spirits among one class, it raised specters and terrors among another, and the same line of cleavage, drawn so decisively on election day, holds to a great extent more than a year later. Such is sometimes the persistency of convictions born of misapprehension.

But there is really nothing so novel about the "new deal" in so far as its individual proposals are concerned. Help for the farmers has been a part—although perhaps not so genuinely a part—of the program of American politicians for nearly a century. And if the proponents of the "new deal" must be able to support their contentions by the sanctions of history, they can point to Justinian, to the early Romans and to the Greeks of Demosthenes' day for evidence of the use of *moratoria* in times of economic stress. The decision of the United States Supreme Court approving the Minnesota mortgage law merely gives American sanction to a procedure as old as Tiberius Gracchus.

And as for government regulation of industry, certainly the operators of railways and public utilities see nothing new in this. In Europe the right of the government to control industry in the public interest was recognized in the Middle Ages and in this country runs back to the Rhode Island railroad commission of 1836. Ever since Henry VIII's Statute of Sewers liberty-loving Englishmen have admitted the right of and the need for government intervention.

Surely the regulation of the hours of labor offers nothing novel, since governments old and new, foreign and our own, have found it necessary to protect the health and the life of workers by preventing overwork and by placing other checks on exploitation. Minimum-wage laws are as old as the thirteenth century and few modern civilized nations are without some form of control over the wages and hours of labor. Labor legislation affecting the well-being, financial as well as physical, of large masses of the people has the approval of majority opinion in every country that makes the least claim to enlightenment.

The control of competition appears almost sacrilegious to business men accustomed to the ruthless commercial practices that have become common in America, but the principle is of long standing. The mediaeval guilds exercised a power over competition that would make a modern capitalist predict the crack of doom, yet those who are well informed about conditions under both types of control, cooperative and individual, see many features in the one that would be of service to the other.

That section of the National Industrial Recovery Act which provides for the recognition by employers of the right of their employees to deal with them collectively and through representatives of their own choosing is not as novel as many appear to believe. It has always been one of the cardinal principles of trade unionism, and has been supported by Supreme Court decision [Texas and New Orleans Railway v. Brotherhood of Railway Clerks, 281 U. S. 548 (1930)] to the extent of compelling the railroad to dissolve a company union and to deal with its employees through employee-chosen representatives.

IN his choice of experts to assist him in the development and administration of the policies of his "new deal" the President has not undertaken anything new. The employment of experts is a necessity in the cases of governments, such as ours, which entrust the making and shaping of policies to men who have no technical or professional knowledge of the problems coming within their jurisdiction and who must, therefore, surround themselves with others on whose information and judgment they can rely. In the case of President Roosevelt the choice of university professors as counsellors has seemed novel only because Americans still cherish the Jacksonian faith in the sufficiency of the plain man and the amateur. The contemptuous manner in which certain politically- and economically-unsympathetic newspapers refer to these advisers as the "brain trust" is indicative of the small-town philosophy that still animates many business men and politicians. To such men anything that lies beyond the range of their narrow circle of acquaintances, their still-narrower reading, and their day-to-day experiences must inevitably appear dangerous because it is in their eyes new.

Perhaps the only true novelty that exists in the "new deal" is the combination of so many public-

weal provisions in a single plan; certainly the enactment of a comprehensive program of social betterment is a novelty in America. But the quality which, it seems to us, above all others gives the impression of newness is the shock which a legislative plan conceived and developed solely in the public interest has offered to business men inured by tradition to approval of a "public-be-damned" attitude. The voice of Commodore Vanderbilt, who gave that phrase its vogue, still expresses the opinions of multitudes of business men who have yet to admit that regulation of industry, considered purely as a phase of social betterment, is a proper function of government. *Laissez faire*, although a dead issue among economists, is a living faith for many men who believe that, because they have demonstrated their capacity for garnering profits—except in times of business stress, be it added—they are competent to direct (by lack of directing) the fortunes of a people. Suddenly, by the simple enactment of a single piece of legislation, men of this type have been brought face to face with the reality of a planned economy in which the interests of the *entrepreneur* are not placed uppermost, but in which the general good is made the objective to the attainment of which every phase of life is made to contribute a reasonable share. Even the coming of the 1929 collapse did not provide such a shock to settled habits and dulled minds.

Men who have habitually resorted to every form of trickery to deceive buyers and to divert their patronage from competitors to themselves do not take kindly to codes of fair competition designed to make them deal equitably with consumer and competitor alike. To most of these the very words "fair competition" present a novel idea, one that is certainly different from "unbridled competition."

Men who have paid as little as 5 cents and 10 cents an hour for Negro labor in the past surely find a striking departure in code provisions which set minima of 25 and 30 cents. We shall soon see how much of genuineness there was in their often-voiced fear of the "sociological problem" which would be created by increasing the Negro's earning capacity.

MEN who have always insisted on the impossibility of operating their businesses on anything less than a 12-hour day are being forced to practice something new, even if they do not see anything new, in operating with 6- and 7-hour shifts. The shock they experience may be likened in novelty to that of Judge Gary, who, after loudly and frequently alleging the utter impracticability of a shorter day, was compelled to reduce his 12-hour shifts to 8 hours each.

Men who have clung to the philanthropic idea of business—so well expressed by Alfred Krupp when he said, "We want only loyal workers, who are grateful in soul and body that we offer them bread"—are experiencing some of the thrill of change, when they find themselves forced to deal with workers on a new basis approaching more nearly that of equality. The shock which this change occasioned has found vocal release in the popular outcry against the rapidly-developing organizing activities of trade unions under the codes.

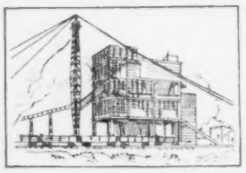
Men who have carried the doctrine of freedom of contract to extreme lengths and, in doing so, have wrecked their own businesses and demoralized the industries of which they formed a part, are living in a new era wherein the chiseler will be outnumbered, outvoted and outmanœuvered by those who, even before the advent of code regulation, wanted to hold prices above cost-of-production levels. There is quite a degree of novelty in a program that outlaws the chisel, the gouge and the padded hammer.

Men who were loud in their praise of the principle of "open covenants openly arrived at" in the field of international affairs pull themselves together with a jerk when the same policy is made applicable to their every-day trading. Open prices and open dealing have no familiar ring to those whose success has depended on commercial knavery and back-door bickering.

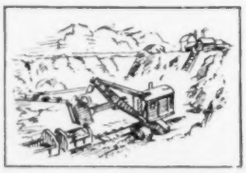
MEN who were accustomed to cutting production costs by lowering the wages and lengthening the hours of labor find themselves on untrodden ground, now that such matters are closely controlled. To many of them it is a decided novelty to find themselves in competition with others on the bases of mechanical efficiency and of the intelligent planning and coördination of purchasing, producing and marketing activities. Thousands of business men are discovering these subjects for the first time, and there is novelty in that.

Men who were in the habit of "going it alone" have learned that they belong to something more than the corner church and the neighborhood lodge. They are still individual business entities, it is true, but they are also parts of industrial fabrics national in scope, and they are learning much of the interdependence of business men and their many opportunities for mutual help and coöperation. Most business men are novices in these newer phases of business conduct.

And this leads by simple expansion to the great principle which underlies the "new deal"—regard for the rights of the other fellow. Those responsible for administering the government's program of improving public welfare are bringing to thousands of business men and to many more thousands of the general public a better realization of the social responsibility that rests upon each one of us. Instead of living as brigands, each one bent on the exploitation of some one else, we are being taught—forcibly and against our will—the wisdom, the practicality, the advantages of sharing responsibility, sharing work, and sharing rewards. The customer is no longer legitimate prey, the competitor is no longer the mistrusted rival, the seller is no longer the thief of old. These ancient stigmas are disappearing, controversy is giving way to discussion, fighting is being displaced by coöperation, suspicion is making room for trust. These are the changes which, in our opinion, have made the present deal a "new" deal. Are business men afraid of these?



'Thirty-Three in Review



A month-by-month summary of the outstanding news events and happenings in the pit-and-quarry field

JANUARY

For the first time in their history producers of crushed stone, sand and gravel and premixed concrete hold concurrent conventions, joint sessions, and a single combined exhibit. Twenty thousand persons, representing these and 19 other national organizations, meet in Detroit for the first Highway and Building Congress, Jan. 16 to 20.

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FEBRUARY

Uniform prices in Missouri cement bids cause uproar which reaches and brings echo from Washington. Nine cement companies share in 1,559,300-bbl. orders. Chicago's mayor rejects one-price cement offers.

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Pacific Coast Aggregates, Inc., gets concrete-mixing contract and Pacific Portland Cement Co. the cement contract for the Golden Gate bridge development at San Francisco.

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MARCH

International Cement Corp. raises prices 10 c. a bbl. and wages 10 per cent. Marquette Cement Mfg. Co. increased wages 5 per cent.

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Alpha Portland Cement Co. begins $150,000 improvements at its Cementon, N. Y., plant.

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APRIL

Governor Horner of Illinois rejects cement bids because the average price quoted, $1.62, is higher than the averages of $1.29 and 94 c. quoted in 1931 and 1932, respectively.

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New York Supreme Court rules that "pin test" is not conclusive evidence in cases of damage caused by blasting in quarries.

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Professor P. Norris Shreve of Purdue University announces successful production of "synthetic" stone, Rostone, from quarry waste.

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MAY

Expecting the passage of the President's proposed bill for industrial recovery, representatives of the National Crushed Stone and the National Sand & Gravel Assns. meet in Washington, May 23. The preparation of a single code for all aggregates producers is decided on.

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National Lime Assn. postpones usual May convention until June to allow discussion of federal industrial-recovery legislation.

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JUNE

President Roosevelt on June 9 signs the National Industrial Recovery Act, appropriating "at least" $400,000,000 for highways and the remainder of $3,300,000,000 for public-works projects, and it passes Congress on June 9. Apportionment of road funds among the states announced on June 23.

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Illinois cement controversy closes by the award of a contract for 2,000,000 bbl. of cement to the Marquette Cement Mfg. Co.

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The National Sand & Gravel Assn. reports the acquisition of 81 new members due to the interest aroused by the National Industrial Recovery Act.

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Lime producers, assembled at Atlantic City, June 28 and 29, adopt code for their industry, the first to be proposed in the nonmetallic mineral field.

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JULY

Cement Institute, through President Charles F. Conn, proposes 36-hr. week and 40 c. hourly wage for the cement industry on July 13 to become effective Aug. 1.

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Two hundred and seventy aggregates producers meet in Chicago, July 13 to 15, and agree on code.

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President Roosevelt appoints ten regional public-works advisors on July 25.

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AUGUST

Lime producers present code of fair competition to N.R.A. in open hearing in Washington, Aug. 8.

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Mineral - aggregates code presented to N.R.A. in Washington hearing, Aug. 28 and 29.

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Makers of premixed concrete meet in Washington Aug. 10 to adopt code.

SEPTEMBER

The National Assn. of Portable Stone, Sand & Gravel Producers holds first meeting in Washington Sept. 14 and drafts a code.

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N.R.A. listens to code proposals of cement industry on Sept. 15.

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Gypsum industry submits code to N.R.A. on Sept. 23.

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OCTOBER

Half of public-works appropriations allotted by Oct. 1.

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On Oct. 3 President Roosevelt approves lime-industry code, the first to win government sanction. It provides a 40-hr. week and hourly wages of from 30 to 37½ c., effective Oct. 13.

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Formal hearing on premixed-concrete code held in Washington, Oct. 26.

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NOVEMBER

President Roosevelt signs cement-industry code Nov. 27, providing 42-hr. week and rates of from 30 to 40 c. an hr., to become effective Dec. 7.

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Harold L. Ickes, public-works administrator, decides to ask for additional $1,500,000 for public-works projects.

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Holger Struckmann, president of International Cement Corp., and General Harry C. Truxler, chairman of the board, Lehigh Portland Cement Co., die

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Mineral - aggregates code approved by President on Nov. 10. Provides 40-hr. week and hourly rates of from 25 to 40 c., effective Nov. 20.

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DECEMBER

Public Works Administration completes approval of public-works projects and exhausts $3,300,000,000 appropriation.

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Sturgeon Bay Co. receives order for 430,000 tons of crushed stone, largest P.W.A. contract reported, for Indiana Harbor project.

General view of operations showing the six aggregate-storage silos at right, and the main conveyor from the silos to the concrete batching plant at left. The new sand and gravel crushing, washing and screening plant described in this article is located immediately behind the silos.

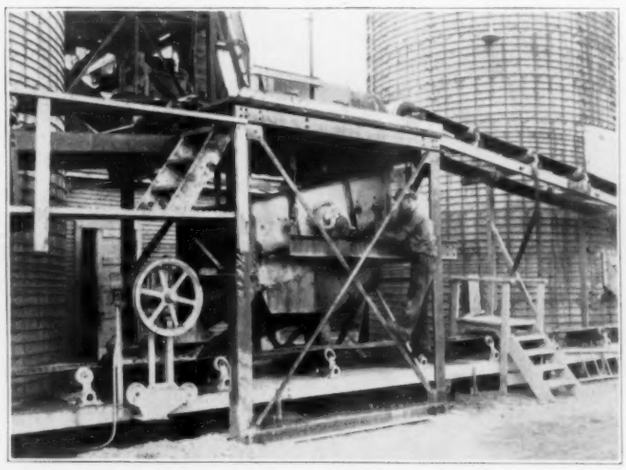
New Peoria Gravel Plant Completed Just in Time to Profit by "Repeal"

Forms Complete Unit with Existing Storage and Central-Mixing Plants

By E. J. PATTON
Stephens-Adamson Mfg. Co.

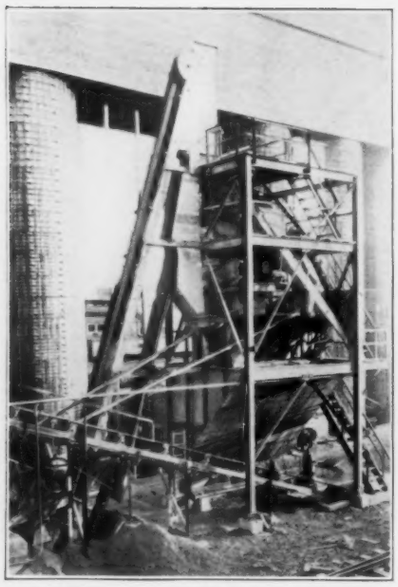
MANY of us have wondered just what the repeal of the Eighteenth Amendment would get us. One answer is "hard licker," but the Lake Erie Mining Co., in Peoria, Ill., has a still more potent answer—"orders for gravel and concrete."

For years Peoria, second largest city in Illinois, has been one of the important centers for malting, brewing and distilling. Temporarily at least, the Earthworm Tractor of *Saturday Evening Post* fame has shifted the limelight, but with "repeal" a fact the distilling industry has shown unmistakable signs of life. Like Rome, good whisky is not built in a day, so one distilling company is building

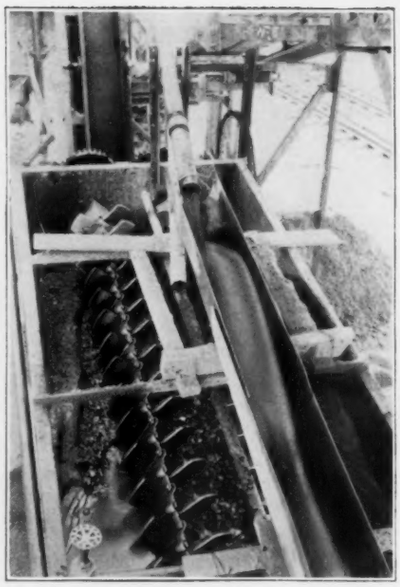


The 2-deck vibrating screen on which the material from the storage silos can be given a final rinsing.

Belt-conveyor which feeds material through screen, crusher and log-washer to bucket-elevator at left.



Close view of gravel plant showing two vibrating screens. Elevator from log-washer at left.



The double-screw log-washer with elevator to screening building in background.

The proportioning plant with car of cement unloading and truck being loaded.

a new $4,000,000 plant and at least two big Peoria distilleries have been hard at work bringing their plants up to date. Several others have been laying plans for active reconstruction work.

Apparently the new plants just completed by the Lake Erie Mining Co. were well-timed, for both its gravel-washing and screening plant and its concrete-batching plant are operating on a 24-hr. schedule to produce guaranteed concrete for distillery projects. The size of the jobs and the new work in sight practically insure a busy schedule for weeks to come.

The Lake Erie installation consists of three units: (1) a new gravel-washing and screening plant; (2) 6 storage silos equipped with a rinsing screen; and (3) a new concrete-proportioning plant—all compactly arranged on the same plot of ground, within a stone's throw of the Peoria Union Depot. The three units are connected by a system of storage, reclaiming and handling conveyors that makes the installation extremely flexible and economical to operate.

The storage silos were built first, several years ago when the firm jobbed sand and gravel in connection with its coal and building-material business. The 6 silos are built of concrete staves; each is 16 ft. in diameter and 50 ft. high and has a capacity of approximately 350 cu.yd. Four of these silos were furnished by the Neff & Fry Co. Originally the sized sand and gravel were delivered by railway, dumped into a track hopper and the different sizes distributed by a Godfrey bucket system. The material was drawn off by gravity for motor-truck or wagon delivery. Later weigh batchers were attached to four of the silos for discharge into mixer trucks.

The new plant was designed and built by Stephens-Adamson Mfg. Co. Although originally designed for a daily capacity of 480 cu.yd., the plant has recently averaged well over 1,000 cu.yd. per day. It was put into operation in June, 1932, and at the present time is one of the finest examples of plants in which all ingredients—sand, gravel, cement and water—are automatically weighed and recorded by means of dial scales and photoëlectric cells.

The next step in the sequence was a new washing-and-screening plant. This was designed and equipped by Stephens-Adamson Mfg. Co., which was asked to complete plans, fabrication and erection within six weeks—a mark not missed by more than a few days. The new gravel plant went into operation about the first of June, 1933, and is unusual in several respects.

Several plans were considered, but the one finally approved was for a semi-portable plant, built entirely of steel and consisting of units which could easily be unbolted and moved to another site if necessary. The plant is not as compact as the self-contained "portables," yet it can be moved without an act of God, and the operating crew has plenty of elbow-room for adjustments and minor rearrangements.

Another unorthodox procedure was the location of the plant in the heart of town, beside the storage silos and concrete-batching plant, rather than at the pit. The answer is simple. The Lake Erie company has several deposits within trucking distance and can deliver from any pit the product of which most closely approaches the proportions and specifications wanted. Likewise, if the deposit becomes exhausted or unprofitable to operate, it is only necessary to move the loading equipment. At present, aggregate is delivered from a pit about 2 mi. from the plant by three 5-cu.yd. trucks to the plant, which has a rated capacity of 40 tons per hr. This means that each truck averages 3 trips per hr.

The aggregate is received in a 10-ft.-square, steel hopper. A 4-in. bar grating holds back the oversize, which is split and put through the plant later.

A 30-in. belt-feeder, operating at 30 ft. per min. and driven from the belt-conveyor tail-shaft, feeds material to the plant at a rate of 40 tons per hr. An 18-in. Stephens-Adamson inclined belt-conveyor, operating on 84-ft. centers and driven by a 5-hp. geared motor, delivers to a Link-Belt 2-ft. by 4-ft. vibrating screen, which scalps off the oversize to a 9-in. by 21-in. Wheeling-type Telsmith jaw crusher driven by a 20-hp. motor. This motor also drives a small 18-in. portable flat-belt conveyor, which carries the throughs from the crusher into the lower end of a 20-in. by 18-ft. double-screw S-A log-washer, driven by a 20-hp. geared motor. Here the aggregate is given a preliminary scrubbing by the rinse water from the washing screens above. A 13-in. by 7-in. by 10-in. belt-and-bucket elevator, driven by a 5-hp. motor, carries the material up to the washing-and-screening plant. At the discharge point a spray of water gives an additional washing and also insures complete discharge from the elevator buckets.

The screening and final washing are done by a series of two double-deck S-A Vibrator screens, the first a 2-ft. by 6-ft. unit and the second a 3-ft. by 6-ft. machine. A 20-in. inclined screw-conveyor, driven by a 3-hp. geared motor, dewaters the final product and delivers it to the sand compartment in the storage-bin. It is possible to produce 5 different sizes, but at present only two sizes are being produced—1½-in. to 3/16-in. and 3/16-in. to torpedo sand, proportioned about 4 to 1. The 5-compartment steel storage-bin has a total capacity of approximately 500 cu.yd. and discharges directly into the concrete hopper, which feeds the Godfrey Conveyor Co. skip-bucket running to the main storage silos. This bucket is controlled automatically, feeding, elevating and dumping to the 2-way shuttle belt-conveyor, which distributes the material to the various silos.

Water for both washing and rinsing is furnished by a Pomona pump, which is driven by a 20-hp. motor and draws from a 10-in. well 61 ft. deep. The capacity is approximately 400 gal. per min. The waste water from the washing and rinsing operations is collected in two large sumps, where the solids are settled and the water discharged by private sewer to Illinois River.

General Electric motors are used almost entirely in the washing and rinsing plants. These are the latest type of self-contained geared motors, that have proved compact, efficient and easy to mount and house. Square D switches are used and General Electric across-the-line starters.

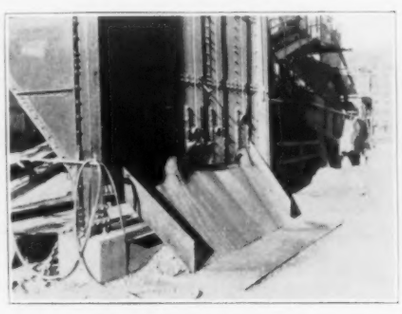
The belt-conveyors in the washing-and-screening plant and those leading to the batching plant have been equipped with Stephens-Adamson "Pacific" type carriers. These are built with three troughing rollers that turn on Alemite-lubricated Timken tapered roller-bearings. Labyrinth-groove grease-seals protect each bearing from the constant exposure to sand and moisture. Goodyear conveyor belting is used.

As sand and the various sizes of gravel are needed by the batching plant they are reclaimed from the silos by gravity on either of two 18-in. S-A belt-conveyors, one above the other. If a final rinsing is wanted, the material is fed to the upper belt and put over a 3-ft. by 6-ft. double-deck S-A Vibrator screen, equipped with a rinsing spray. This screen feeds the rewashed material to the lower belt, which also carries it direct from the silos up to the large cylindrical bin above the batching plant.

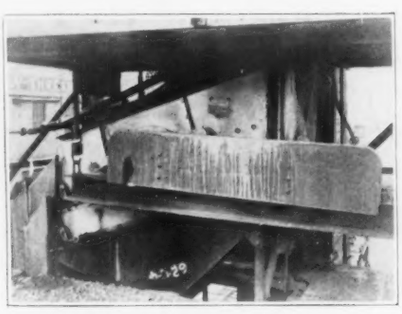
This conveyor, 18 in. wide and 304 ft. long, is driven by a 15-hp. General Electric motor through a Jones herringbone-gear speed-reducer and is fitted with a ratchet-and-pawl holdback. A turnhead distributing spout at the discharge end can be "spotted" by a system of cables and an indicating handwheel from the ground beneath, thus enabling one operator to discharge from any silo into any of the 6 aggregate compartments above the batching plant. A swinging paddle on the distributing spout sounds a tell-tale warning to the conveyor operator below when the bin is filled, and the feed must then be stopped or turned into another section.

Bulk cement is delivered to the plant in box-cars, from which it is elevated to the overhead bin by means of a portable-type Fuller-Kinyon pump, driven by a 30-hp. Westinghouse motor. The cement is handled at a rate of 20 tons per hr. through a flexible hose to storage by the pump, which is located in a shed beneath the batching plant. Air

Belt feeding from truck hopper to plant conveyor.

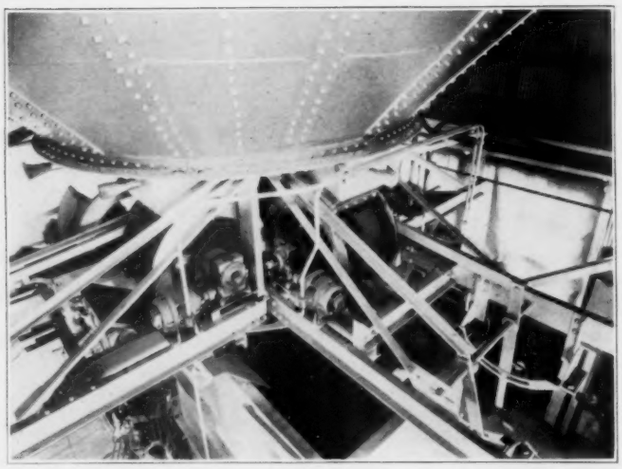


Gravel plant storage-bin discharge to storage-silo hoppers.

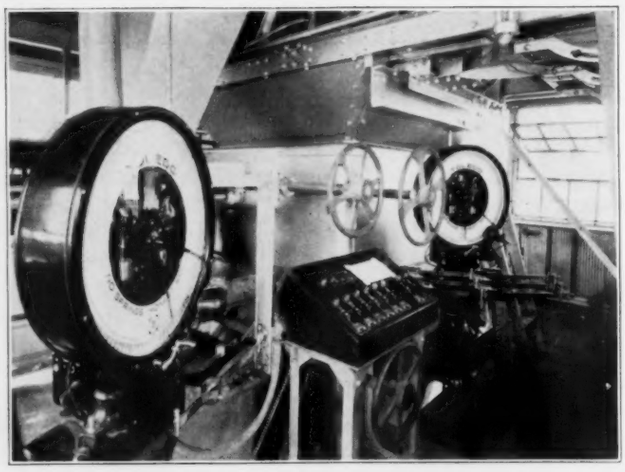


One of the two 2-deck vibrating sizing screens.

One of the trucks dumping raw material into plant hopper.



Some of the 6 roll-feeders which discharge aggregates from bins into weigh-batcher.

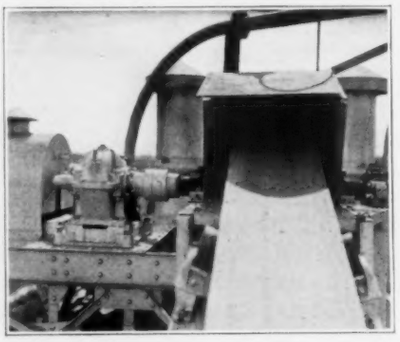


The apparatus which automatically controls the weighing of all concrete ingredients.

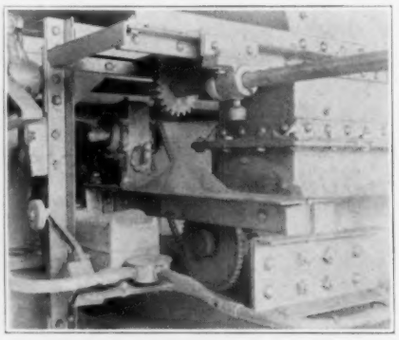
for the operation of the cement-handling system is furnished by a Fuller Co. rotary compressor, which is operated at 1,600 r.p.m. by a Westinghouse motor.

The batching plant is a self-contained unit composed of a large, 8-compartment, cylindrical storage-bin for aggregate and cement, beneath which are housed two batch hoppers, scales and recording equipment and the automatically-controlled feeders for cement, aggregates and water. A 75-ton circular aggregate compartment forms the core of the bin and about it are arranged 7 radial aggregate and cement compartments. Of these 7 compartments in the large storage-bin two 60-ton sections are reserved for cement, one for state-inspected cement and the second for standard concrete batches. Aggregates and sand are stored in four 50-ton radial sections and a 75-ton radial and a 75-ton center section. This is one of the few batching plants in the country equipped to handle so many different sizes. As a result, Lake Erie batched concrete can always be proportioned to meet any specifications.

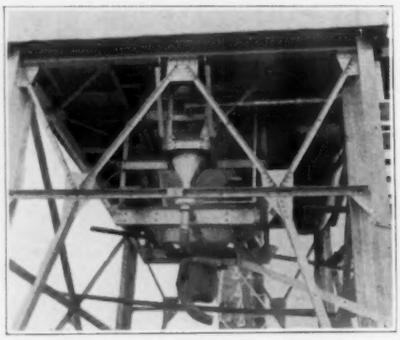
The bottom of the main bin tapers off into a cone that terminates in central openings for the 8 feeders. All the valleys and corners have been rounded and have a slope of at least 45-deg. to facilitate a free and uniform discharge. The two cement bins are emptied through specially-designed S-A rotary cement feeders, each consisting of a rotary vane for feeding and a rapid-acting, rotary cut-off valve. The 6 different sizes of aggregates are fed out by individual roll-feeders. Each is driven by a ½-hp. G. E. motor, through a Jones worm-gear speed-reducer. Cement is kept from bridging in the bins by air jets blowing upward through the bottom plates. The air is supplied by a Gardner-Quincy compressor.



Inclosed motor and speed-reducer drive of conveyor to top of concrete plant.



Motor and worm-gear reducer drive of one of the cement feeders.



Batching floor from below showing apparatus for loading mixer trucks.

All the batching is done in two S-A weigh-hoppers, each of which is equipped with a Toledo dial scale, fitted with a print-slip recorder and a photoëlectric cell to stop each feeder automatically as the required weight of material has been fed into the hopper. The scale dial affords a quick visual check and the printed record slip is used by the accounting department. One hopper and scale have a capacity of 25,000 lb. and have an individual beam for each of the 6 aggregate feeders. The second hopper and scale have a capacity of 5,000 lb. and have separate beams for weighing cement and water.

The convenient control panel, designed by Stephens-Adamson and built by General Electric, stands between the two scales. This panel has 6 push-buttons for the various sizes of aggregates, 1 for cement, 1 for water, and 1 which stops the entire operation. To proportion a batch the operator sets each scale beam for the amount of material speci-

(Continued on page 76)

Cement Industry Uses Depression Period as Opportunity for Improvement

Plans of Operation, Combustion Methods and Clinker Cooling Undergo Revision

By RAY C. NEWHOUSE

Chief Engineer, Crushing & Cement Mchy. Div., Allis-Chalmers Mfg. Co.

NO executive in the cement industry can look on the depression as a blessing in disguise or otherwise, especially when he looks at his balance-sheets for the last three years. Even now, with better prices and the indications that more cement will be used during 1934 than during the past two years, he often wonders whether the demand for cement will ever be such that he can again run his mill at capacity. Such thoughts are quite natural when he remembers that approximately 176,000,000 bbl. of cement were shipped in 1928, and 80,000,000 bbl. in 1932. It is even more discouraging that the value of the output was approximately $275,000,000 in 1928 and $80,000,000 in 1932.

Ray C. Newhouse

Nevertheless, when he analyzes the facts, he finds hope for the future. He knows that not only he, but also his competitor, has learned that it is impossible to run the mill at full capacity at a profitable price when the total demand is much less than the total capacity. The past three years have conclusively demonstrated that he must sell his product at a loss, if he is unwilling to let his competitor have some of the business. Under these conditions he does not object to a code which prohibits his selling at a loss, since the same code is binding on his competitor. He has also learned that it is possible to operate his mill at reduced capacity without adding greatly to his unit cost, excluding the one item of depreciation. He also knows that his operating department, through stress of circumstances, has not only been able to improve efficiency but has also, by reason of reduced demand, found ample time to improve the quality of the product, thereby adding to the aptness of the slogan "Concrete for Permanence."

During the "boom" years the cement industry, like other basic industries, was inclined to rank, in order of importance, safety, tonnage, and cost. During the depression the cement industry has shown no tendency to remove safety from its rightful first place, but it has placed cost ahead of tonnage. The study given to this subject has resulted in savings when operating at reduced capacity. No exact maximum economic capacity for a rotary kiln, which will be the same for all conditions of demand and mill price, can be determined, but there is a maximum capacity beyond which it is not economical to operate a kiln regardless of the demand and the price obtained for the cement. There is no profit in forcing a kiln to a point where there is not only an excessive repair cost, but where the time lost by such repairs actually reduces the average monthly production. It is much more profitable, even with the same cost of fuel per barrel, to operate a kiln 30 days at a capacity of 1,100 bbl. per day than it is to operate it 27 days at 1,200 bbl. per day with 3 days' loss in time due to trouble with the lining of the kiln.

Plans of Operation.—During the days of reduced production three methods of operation have been tried. Some operators advocate running all equipment at full production until the silos are filled, and then shutting down completely until shipments justify starting up again with the same scheme of operation. Others advocate running a sufficient part of the equipment continuously and at full production, the proportion of the total plant equipment operated being regulated by the average shipments. A third scheme of operation is based on the theory that during "boom" times cement-plant equipment has been operated much above its economical capacity. While this is applied especially to the kilns, it is contended that the grinding machinery and other parts of the equipment have been operated continuously without sufficient attention to the making of repairs at the proper time. This school believes in always following the old adage that "a stitch in time saves nine," unless there is sufficient profit gained in avoiding a shut-down to guarantee that the excessive cost of repairs will be more than equalled by the profit on the additional capacity. Even in this case, however, they claim that a better opportunity during the depression to make needed repairs at the proper time has shown that the maxi-

mum production during several months can best be secured by shutting down a piece of equipment whenever any vital repair is needed.

Combustion Methods.—The lessened demand for production has given the operator not only an opportunity to determine the most efficient capacity for his kilns but also to study the most efficient method of combustion. He may have decided that his fuel-burning apparatus is of a type that precludes efficient combustion and should be replaced by more modern equipment. The most common defects of coal-burning equipment are that the pulverized coal may flush, it may be delivered irregularly, or the nozzle may be so small that too high a fan pressure is required to deliver the proper amount of primary air. While the last-named condition may cause the use of more power than is needed to produce the proper velocity in the blast-pipe, with properly-designed coal-burning equipment it may not interfere with combustion. The first two conditions, however, cause a waste of fuel when, through flushing or irregularity in the feed, a constant supply of fuel is not delivered to the burner. With the proper average air-supply for efficient combustion, an excess of fuel naturally causes carbon monoxide in the stack gases and a deficiency of fuel at any instant causes an excess of oxygen and nitrogen which not only carries heat out of the kiln, but may result in so lowering the temperature that the clinker is not properly burned.

With the sales department clamoring for the shipment the next day of 10,000 bbl. of cement which was not even in clinker storage, there was little opportunity for the operator to devote his attention to efficient combustion or the most efficient kiln capacity. His chief aim in life at that particular time was to discover how a kiln rated at 1,000 bbl. daily capacity could produce 1,300 bbl. in 23 hr. with 1 hr. lost patching the lining. Even if he had a little free lime in his cement, the proper amount of water added to the clinker would hydrate the lime. The water might make the clinker a little harder to grind, but until recently, when finer grinding became customary, most cement plants had an excess grinding capacity, and, to the credit of the industry, it may be said that little unsound cement was shipped even by those who forced their kilns during "boom" times. The depression has eliminated the necessity for such practices and has given the operator an opportunity to learn that, if desirable, he can still profitably obtain an average production equal to that formerly obtained when he was forcing his kiln to a point that caused frequent shut-downs.

The depression has also given both the operator and the refractory manufacturer opportunity to devote considerable time to the study of the best type of lining. It is often found profitable to substitute lining with a very high first cost by reason of its much longer life, thereby resulting in a saving in the total purchase price and the elimination of frequent shut-downs.

Clinker Cooling.—The kiln has been called the heart of the cement plant, and in most cases it limits the capacity of the plant, but its efficiency is influenced to a large extent by the grinding machinery which precedes it and the cooler which follows it. As early as 1919 the writer conducted tests which demonstrated that quickly-cooled clinker is much more easily ground than slowly-cooled clinker. Whether the clinker is cooled quickly in air or suddenly chilled by quenching in water, its grindability is much better than that of slowly-cooled clinker. However, water-quenching is objectionable, not only because the heat of the clinker is lost and the clinker must be dried, entailing the further expenditure of heat, but also because in the average kiln the clinker is discharged in a partially-reduced condition.

Water also affects the quality of the cement. This is especially true in a kiln using oil or gas as fuel, where the high percentage of primary air prevents the use of sufficient secondary air to oxidize the clinker between the fusion zone and the discharge end of the kiln. Many kilns using pulverized fuel have for years discharged a thoroughly-oxidized clinker where the normal percentage of primary air is used, as the secondary air sweeping over the clinker acts as a blanket to prevent the reducing action of the flame, which is always reducing in the fusion zone, as has even been found at times when more than the theoretical amount of air for complete combustion has been used with natural gas as primary air. Where a high percentage of primary air is used with pulverized coal, the clinker will be reduced because the expansion of the flame, due to the high percentage of primary air, prevents the secondary air from acting as a blanket between the flame and the clinker. (The reducing action herein mentioned refers to the iron oxide in the clinker, as that is the only important ingredient of Portland-cement clinker which is reduced in a rotary cement kiln.)

The rotary cooler is ideal for oxidizing any reduced clinker discharged from the kiln, since the hottest air comes in contact with the clinker as it enters the cooler, but as generally constructed it is objectionable for quickly cooling the clinker through the critical temperature, not only because the hot air comes in contact with the hot clinker, but also because the high temperature at that point destroys any ordinary metal, resulting in the use of fire-brick in the upper end of the cooler. As the fire-bricks can not well be used as lifters and they have little heat conductivity, the clinker is slowly cooled through the critical temperature before it comes in contact with ordinary metal lifters. When it became possible to obtain heat-resisting alloy steel at a price which was not absolutely prohibitive, some coolers were provided with lifters of this metal, making it possible to eliminate the fire-bricks at the feed end and to improve results, but, on account of the high temperature of the air at this point, there is not a sufficiently-rapid cooling of the clinker to produce the best grindability or improved strength of the cement.

While the above principles had been known for several years preceding the depression, it was not until after the depression started that there was any commercial exploitation of a cooler superior to

the rotary cooler. Since that time, three types of coolers, similar in principle, but differing in details, have been constructed. Two of these are commercially available today, and either is superior to a rotary cooler. These coolers consist of a grate over which the clinker is conveyed and through which the cooling air is blown. The more rapid cooling of the clinker by bringing a strong blast of air at normal temperature in contact with the clinker, thereby rapidly chilling the clinker through the critical temperature, makes it easier to grind and produces a stronger cement, especially in the early days of hydration. At one time it was thought that this rapid chilling might cause some chemical change in the clinker, but subsequent research has so far disclosed no difference except in the size of the crystal structure. It has long been known that the rapid chilling of steel through the critical temperature makes it brittle and produces smaller crystals. Grinding tests and an analysis of the particle sizes indicate that a similar action takes place in the clinker rapidly cooled. It has been known for years that rotary-cooler clinker is easier to grind than clinker slowly cooled in storage. In this case, a part of the difference in grindability may be due to the better oxidation of the clinker in the rotary cooler than in storage, but, since the conditions for oxidation are even more favorable in the rotary cooler than in the grate-type cooler, it is evident that the difference between the rotary-cooler clinker and the grate-type-cooler clinker lies in the brittleness and size of crystals. When the two latter clinkers are compared, it is found that, when ground to the same 200-mesh-screen fineness, the percentage of minus 10 microns is much higher in the rapidly-cooled clinker.

Filters, Recuperators and Classifiers.—While the greater number of plants have sought during the depression to improve the operating efficiency of existing machinery, some companies have replaced a part of their machinery with more modern equipment, or increased the efficiency by adding additional equipment. Under the latter classification may be listed the installation of filters on kilns to reduce the moisture content of the slurry and the use of heat-recuperating devices at the upper end of the kiln, such as chains in wet-process cement plants and other heat-transfer devices in dry-process plants to reduce the temperature of the stack gases. Appreciable savings have been effected, but since all practical heat-transfer devices at the upper end of the kiln, except waste-heat boilers, increase the capacity of the kiln, there has not been the incentive to install such apparatus as there would have been if there had been a demand for the additional capacity.

Many companies have installed classifiers, such as air-separators in dry-process plants. Here again the use of apparatus which has demonstrated its efficiency and power saving, especially in the raw-grinding department, has been delayed by reason of lack of demand for the additional capacity resulting from the use of classifiers. An investment which can quickly be amortized, where additional capacity is needed, may not appear profitable where there is already excess capacity. However, sufficient gain in efficiency has been demonstrated that we may expect further use of classifiers for improving the efficiency of existing grinding machinery and in connection with new grinding mills designed to use classifiers most efficiently.

Grinding.—During the depression some companies have installed in their raw-grinding departments air-separators and entirely new grinding machinery especially designed to remove by classification the material which has been reduced to a size proper for kiln feed and to return the oversize to the mill for additional grinding. One company installed an entirely new clinker-grinding department, replacing machinery which would not even be considered obsolescent by many. This company has not only been able to secure a considerable reduction in grinding costs, but has also improved the quality of the product. In the installation referred to air-separators have been used in connection with mills not only designed for use with classifiers, but also to produce the minimum possible percentage of objectionable extreme fines. These extreme fines will be referred to later under the discussion of particle sizes.

While, as referred to above, several companies have made improvements in grinding equipment, others have decided that in their plants the most needed improvement was in the kilns. New kilns have been installed and large economies in fuel consumption have been obtained.

Some power companies allow a practically unlimited use of power during certain hours of the day without making a demand charge for such power. Power used during such hours is usually referred to as "off-peak" power. While a cement plant has a higher load factor than that found in most industries, the demand charge amounts to a considerable percentage of the power bill, and would even if the load factor were 100 per cent. The reduced operating capacity during the depression has given those cement companies operating with such power contracts an opportunity to operate their grinding machinery principally on "off-peak" power, thereby materially affecting their power bills. Unfortunately, there has been little incentive during the depression for those power companies who do not have such a rate schedule to put such a schedule into effect, as their power plants are underloaded, but under normal conditions an "off-peak" no-demand charge is of benefit to the power company, as the building up of a load when there is a light demand allows a power station of given capacity to generate much more total power. As it is probable that within a relatively short time most power companies will be loaded nearly to capacity, we may expect that the more favorable rate for power during certain hours will become more general than it has been in the past. No better indication can be found that power companies realize the desirability of building up a steady load, even with their generating stations underloaded, than the fact that some of them with a long-range view for the future, now allow a rate for domestic water-heating by electricity during "off-peak" hours that makes elec-

tricity cheaper than gas. With the increasing tendency to grant a more favorable rate for "off-peak" power, those cement companies which purchase power will do well to give consideration to providing sufficient grinding capacity that their demand charge may be reduced. Even now progressive power companies are giving consideration to the future and will be willing to offer inducements to the power user who will consume the most of his power during those hours when the general demand is light.

Special Cements.—During the depression considerable thought has been devoted to special cements for special uses. The special cement which has attracted the greatest attention is the low-heat cement for Boulder Dam. The development of this cement can scarcely be credited to the depression unless it be assumed that Boulder Dam would not have been built if there had been no depression. The objection to the large amount of heat generated in a massive concrete structure such as Boulder Dam has been recognized for some time by prominent engineers. Not only is more heat generated by reason of the mass, but the thickness of the dam prevents the gradual dissipation of the heat which takes place in the average concrete structure. As the hydration of the coarser particles continues to liberate appreciable quantities of heat for months after the concrete is set, it is evident that a dangerous temperature may be produced in concrete of great thickness if means are not provided to keep this heat at the minimum.

More recently there has been considerable discussion about other special cements. It is probable that such discussion has been more general than it otherwise would have been, if so much attention had not been attracted to the special cement for Boulder Dam. There is, of course, a need for high-early-strength cement in certain places where the concrete must be subjected to load soon after it is put in place. In many places sufficient strength may be obtained in the required time simply by increasing the proportion of cement used. Research has also shown that the early strength of cement is greatly increased by a very thorough tamping of a low-water-ratio concrete. It is therefore hoped that normal Portland cement may continue to be used for most general purposes, as it has been in the past. If it becomes the style to specify a special cement for some small concrete job where the intelligent use of normal Portland cement would give satisfactory results, concrete will become more expensive and the use of substitutes will be encouraged. It must be recognized, however, that there are places where special cements will be demanded.

Particle Sizes.—During the depression several investigators have made a study of the rate of hydration and the strength at different ages of the different sizes of particles in a normal Portland cement. Much careful research, which would probably not have been done under the necessity of producing as much good cement as possible during "boom" times, has been devoted to this subject. The general result of these investigations has shown that, within the range of classification generally made, the smaller particle sizes have the greatest strength at the early stages of hydration. These investigations have shown, however, that somewhat coarser particles, say, from 10 to 20 microns, have good strength in a relatively short time and that even the plus 200-mesh particles show appreciable strength at the end of one year with increasing strength later. It is therefore indicated that there is no optimum particle size for normal Portland cement and that for a permanent concrete job a gradual gradation of sizes, such as is obtained in the ordinary processes of grinding, is desirable.

One cement-machinery manufacturing company, in its desire to determine the effect of different particle sizes and thereby be better informed concerning what is needed in a cement-grinding machine, has conducted a rather extensive investigation in its research laboratories regarding the strength of different particle sizes at different ages. Like those investigators directly connected with the cement industry, it has found that, within the range of separations generally made, the highest early strength lies in the smallest sizes. However, in carrying the investigations further, it has learned that the minus 1-micron particles have less strength both in the early and later stages than that part of the cement running less than 10 microns. Since the average normal Portland cement contains an appreciable quantity of minus 1-micron material and since, according to the generally accepted Rittinger's law, it requires ten times as much power to produce 1-micron material as it does to produce 10-micron material, it seems evident that it is desirable to eliminate as far as feasible the production of 1-micron particles. In making these tests special care was used to prevent hydration of these microscopic particles by exposure to the moisture of the air. Whether the unsatisfactory results with the tests of these small particles, of a size requiring more than 25,000 of them placed touching one another in a line to equal 1 linear inch, is due to hydration before they have been placed in the mold or to other causes has not been determined up to this time.

In conclusion it may be stated that the cement industry has generally improved its efficiency during the last four years and placed itself in a better position to meet an increasing demand for cement commencing with the new year, 1934. Since some startling innovation, involving great inventive ability, would be required to place aërial navigation ahead of the automobile as a means of popular transportation, we may expect a greater number of automobiles during the next few years than we have ever seen up to this time. This will result in the paving of many unimproved highways and the widening of many already paved. The home of the near future will be air-conditioned and therefore generally constructed with insulated walls. Improvements in light concrete aggregates will lead to the use of cement in the walls of buildings and increase its use for floors. Hundreds of thousands of people are now "huddling" who want homes of their own and who will have them when their financial condition makes ownership possible.

General view of the operations of the Kingston Trap Rock Co. Crushers, with dust-collecting unit, at right; screening and storage tower, center; loading and washing building, left.

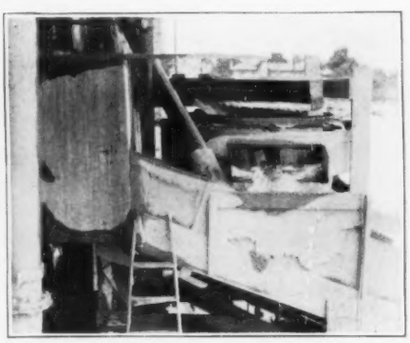
Unseasonal Activity in the Crushed-Stone Industry Marks the End of 1933

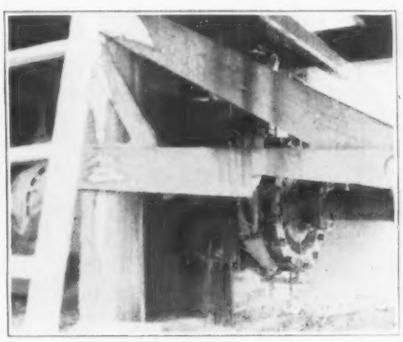
Producers Find Many Profitable Outlets for Stone Dust and Sand Formerly Wasted

THE year 1933, while disastrous to the producers of aggregates and other construction materials, was also notable for the fact that it marked the upturn from a period of depression during which the ratio of production to capacity of these materials reached an all-time low. Figures for 1933 are not yet available but from indications they will undoubtedly show that the year was somewhat behind 1932 in both the volume and the value of production.

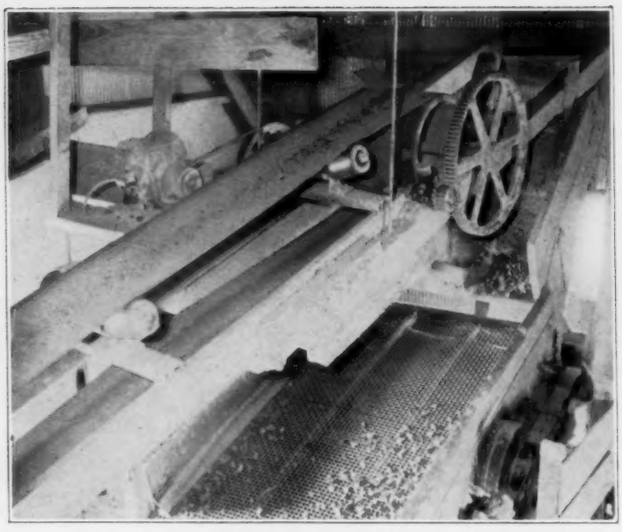
More important is the fact that the last few months of the year showed considerable improvement over the same months of the preceding year, not, however, wiping out the deficit of the preceding months. This improvement shows every sign of gaining momentum as 1934 progresses. Present activity is due largely to demands for material for C. W. A. work and optimism for the future is based on the expected demand for material when the close of the winter season allows active progress on the thousands of P. W. A. construction projects on which the preliminary work has been largely completed. The pressure being brought by Public Works Administrator Harold L. Ickes to push winter construction is also beginning to show results. In many cases plants which had shut down for the season in August or September opened again in late November and December, either to supply present demands or to build up stocks for the expected spring demand. One outstanding example of business due to P. W. A. projects was the contract received by a Wisconsin producer for 430,000 tons of stone to be used in the construction of breakwaters at Indiana Harbor, Ind., and Port Washington, Wis.

Prospects for the future are not confined to government-financed projects alone, however. Reports on contracts let for material to be used for other types of work are being received daily. Prominent among these is the order received by a large southern producer of crushed stone for railroad bal-

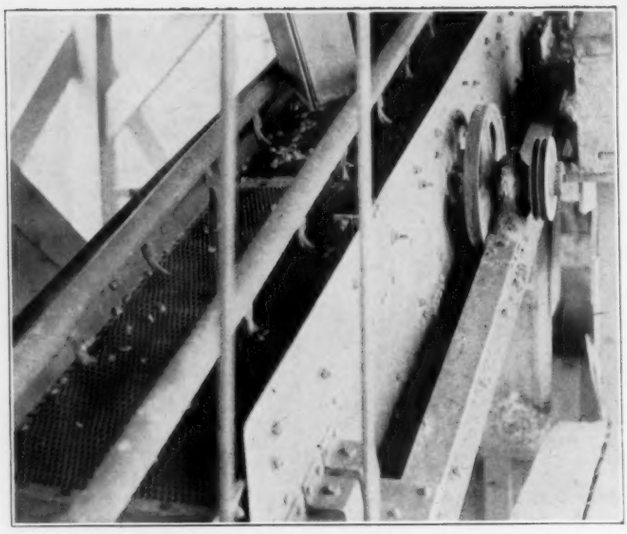




Left to right: Vibrating screens, rotary classifier, and centrifugal pump, used for production of graded "fines" at plant of Wagner Quarries Co., Sandusky, O.



Conveyor feeding vibrating screen in plant of Springer Stone Co.



Vibrating screen, with perforated plate, at Otsego Quarries, Inc.

last for 390 mi. of track from a railroad of secondary importance. It is expected that orders for ballast, which have been almost negligible in the last few years, will resume their former importance as a market for crushed stone. Increased business and revenue and R. F. C. loans to railroads for improvement of their facilities, combined with the fact that railroad roadbeds have been allowed to deteriorate in recent years, should revive purchases of this material considerably.

The year was again notable for the development of new uses for crushed-stone products and waste. Stone sand has become firmly established and is almost universally accepted as a suitable ingredient in concrete and for other purposes. Stone dust, which formerly had a limited market, has in some sections become so popular as an asphalt filler that producers are unable to supply the demand and are trying by various means to increase their production of dust as economically and efficiently as possible. Rock wool is another product which is growing rapidly in popularity as an insulator. With the expected development in building construction this should become an important by-product.

The price situation promises a better year for crushed-stone producers regardless of the extent of business recovery, as many efficient plants can be operated at a profit with a comparatively small output, if reasonable prices can be obtained. Indiscriminate price-cutting and unfair trade practices, which are rapidly disappearing due to the codes of fair competition now in force, were responsible for much of the financial loss suffered by this industry even in good times, and this condition was intensified during the depression.

The number of new plants built in 1933 showed no appreciable change from the previous year's record, but the average size of these plants was somewhat smaller. This trend is probably largely due to the increased amount of secondary-road construction now being done, for much of this material can not be supplied economically by the larger plants located near what are normally large centers of building construction.

Kingston Trap Rock Co.—Probably the outstanding crushed-stone plant of the year, from the standpoint of modernity, capacity and new developments of interest to other producers, is that of the Kingston Trap Rock Co., Kingston, N. J., which went into operation during the summer of 1933. Unusual features of this plant are the use of a Kern tower system of storage, believed to be the first used by a crushed-stone plant, and the reclaiming and storage of dust at the three crushers of the plant by a dust-collecting system. The present capacity of 300 tons per hr. can be increased by speeding up the conveyors and adding some screen capacity.

Plant of Otsego Quarries, Inc. Crushers at left are at quarry level.

There is nothing unusual about the quarrying methods now in use. The stone is loaded into Mack trucks by Marion electric shovels. Tunnel blasting is being experimented with and may be adopted if the initial blast of about 75,000 tons is successful. The primary crusher is a Farrel-Bacon 42-in. by 60-in. jaw crusher. Oversize is scalped by a Robins vibrating screen and returned to two smaller crushers of the same make and type. Screening is done by two 3-deck Robins screens.

The tower storage system has 8 compartments with a live capacity of 1,800 tons. By the use of a

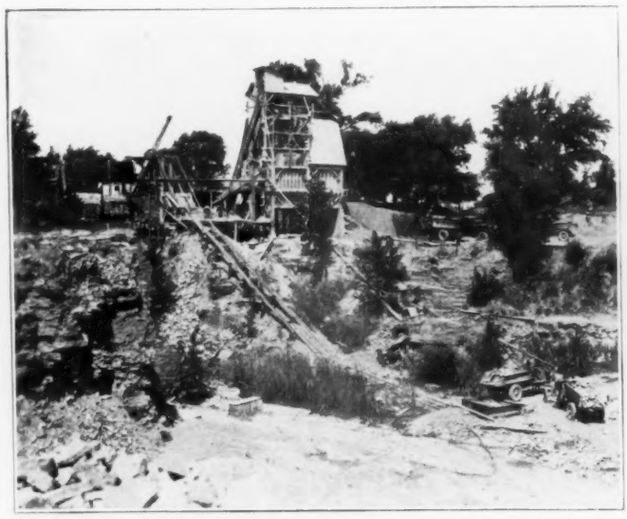
Sauerman Crescent scraper system this capacity can be increased to about 200,000 tons. A tunnel conveyor recovers the stored material and delivers it to the washing building where it can again be rinsed over a Niagara 1-deck vibrator before going to a bin from which it can be loaded into either trucks or cars.

Springer Stone Co.—One of the more important crushed-stone plants of the year is that of the Springer Stone Co., Inc., which is on Mohawk River about 12 mi. west of Schenectady, N. Y. This plant went into operation on Mar. 1, 1933, and has a capacity of 125 tons per hr. While this is a thoroughly modern plant, its chief feature is the fact that all shipments are made by motor trucks.

Office of Springer Stone Co. with part of plant in background.

Air-drills are used exclusively in the quarry and the stone is loaded by a Byers shovel into trucks, which discharge it into the primary crusher at the plant. This is an Allis-Chalmers 40-in. by 42-in. unit, which feeds by belt a double-deck Robins vibrating scalping screen. The two oversizes go to an Allis-Chalmers gyratory and a Kennedy-Van Saun gearless crusher, all three sizes being discharged finally to a conveyor. This feeds a Robins 3-deck sizing screen from which one size and dust go direct to storage. The oversize goes back to the gearless reduction crusher. The material retained on the lower deck goes to a single-deck screen which removes more of the dust. The remainder of the stone is chuted to another Robins 2-deck screen which does the final sizing. Truck shipments are weighed on a Fairbanks truck-scale at the plant office.

Otsego Quarries, Inc.—The crushed-stone plant of Otsego Quarries, Inc., near Springfield, N. Y., which went into operation in the spring of 1933, is a small operation of only 50 tons per hr. capacity but has a number of features which made it of interest to all producers. The quarry floor is considerably above the level of the plant site, making possible a downhill design of plant with a low power consumption. The use of vibrating screens for scalping and fine screening and of a revolving screen for intermediate sizing and the use of perforated plate on the vibrating screens are of interest. A Koehring shovel loads the excavated material into White and Packard trucks which supply two Acme jaw crushers set side by side, either or both of which can be used for primary work if necessary. Ordinarily, however, the larger one is used as a primary and feeds by a belt-conveyor to a Niagara vibrating scalping screen on the top of the plant. If desired, the oversize from this screen can be sent by a horizontal belt-conveyor to the smaller jaw crusher for further reduction. Ordinarily this oversize is taken by belt to either a smaller Acme jaw crusher or a small Kennedy-Van Saun gearless gyratory. These discharge their products on a belt-conveyor which feeds the main conveyor running back to the scalping screen. Most of the sizing is done by a Telsmith rotary scrubber-screen, all sizes going direct to storage except the minus $\frac{5}{8}$-in. which goes to a 2-deck Niagara screen for further separation. The minus $\frac{1}{8}$-in. goes to a settling basin. The storage-bins are so arranged that any size can be fed by gravity to the Kennedy crusher. All shipments are made by motor trucks and are weighed on a Fairbanks scale.



View of J. E. Osborn & Son plant showing truck dumping into skip car which discharges into primary crusher.

Loader rehandling sized stone from stock-pile to truck for shipment at plant of J. E. Osborn & Son.

Wagner Quarries Co.—The plant of the Wagner Quarries Co., Sandusky, O., was built in 1924 and at that time was considerably ahead of most of its contemporaries. It was one of the first to install centralized electrical control of all plant departments and was also one of the first to wash all its products and to adopt the vibrating screen. The present capacity of the plant is about 50 tons per hr.

For some years this plant had managed to dispose of all the stone dust created in the plant operation. Recently, however, this demand increased rapidly, due to the growing popularity of the dust for stone sand and as a filler for asphalt pavements. As the demand for coarser sizes was very small, it was decided to install equipment for the manufacture of stone dust. This program was completed late in the winter of 1932-33.

The plant is not unusual in the handling of its coarse material, the quarry stone going first to a gyratory primary crusher, then to a revolving scalping screen. Oversize goes to two gyratory recrushers and to a pair of secondary revolving scalping screens. A Jeffrey hammer-mill further reduces the oversize coming from these screens, and a second hammer-mill can be used to reduce further the coarse sizes taken from storage for which there is little demand. Sizing and washing of the stone is done by 15 Niagara vibrating screens, some of which are equipped with sprays to wash the stone.

The screens discharge direct into storage-bins. The waste water and "fines" were formerly carried off through a flume to a concrete settling tank, where the suspended fines were allowed to settle and were removed from time to time by a crane. Some fine material was also collected from the dry screens. Now the wash-water from the screens containing the "fines" is flumed to a small tank, where it combines with the dry "fines." This is then flumed to a Wood Auto-Vortex classifier which is set to overflow half of the water and to make a separation line at 100-mesh. A Morris slurry pump under the classifier discharges over a triple-deck Niagara vibrating screen. The "fines" retained on these decks are added to grades of stone which are deficient in these sizes. The material passing through the 4½-mesh lower deck is flumed to another Auto-Vortex classifier which wastes the fines below 100-mesh. The sand settled out in this classifier is given a final rinsing and dewatering in a Webster inclined double-screw washer. A total of about 35 tons of sand, containing from 2 to 2½ per cent. of minus 100-mesh material, is reclaimed per hr.

J. E. Osborn & Son.—The improvements made early in the year to the plant of J. E. Osborn & Son at Belle Center, O., illustrate clearly the practicability of modernizing small and obsolete plants. No improvements of any consequence had been made to this plant since 1922, but it was practically rebuilt in the spring of 1933 and as a result can now produce at a cost which enables it to compete on even terms with the most modern of new plants. It has a capacity of 30 tons per hr. of ¾-in. stone.

Dump trucks are used for hauling the stone from the quarry to the plant. A car is hauled up an incline to the plant and discharges to the Good Roads primary jaw crusher. An elevator feeds a Deister Plat-O 3-deck vibrating screen, the oversize from the top deck of which goes to a New Holland double-roll reduction crusher and is returned to the same bucket-elevator. The other two coarse sizes produced by the screen are fed to a Niagara gyrating-tube scrubber, the finished product going direct to storage. The fine material passing through the lower deck of the screen goes to a settling tank from which it is taken to storage by another bucket-elevator.

This plant makes truck shipments only, these being weighed on a Fairbanks truck-scale. A Barber-Greene stock-pile loader is used to rehandle stock-piled materials. Only four electric motors are used to operate the plant proper. One drives the two crushers and the hoist, one the two bucket-elevators, while the screen and the scrubber have individual motors.

Following are brief descriptions of a few of the many other new plants and important plant improvements made during the year or now under way.

The Worlock Stone Co., Canastota, N. Y., during the summer put into operation a complete new washing plant with a capacity of 100 tons per hr. alongside its crushed-stone plant. A Niagara gyrating scrubber and a vibrating screen, a Columbus sand-drag box, and belt-conveyors were among the new units installed.

The Penry Stone Co., Radnor, O., made a number of improvements to its plant. Motor trucks were substituted for railway haulage from the quarry to the plant; a new crusher and Simplicity vibrating screens replaced the old equipment.

The Columbia Quarry Co. installed four new Ford V-8 trucks for haulage from its quarry to the plant at Columbia, Ill. The plant at Krause, Ill., was modernized by the installation of two Stephens-Adamson vibrating screens, belt-conveyors and other equipment. A new quarry was opened near Chester, Ill., for the production of rip-rap. Crushing and screening equipment is now being installed and a gasoline-powered shovel has been purchased.

The Tidewater Stone Co., Tarpon Springs, Fla., completed a modern new crushing, screening and washing plant.

The New Castle Lime & Stone Co., New Castle, Pa., during the year leased the plant of the Kittanning Limestone Co., Kittanning, Pa., and made improvements which doubled its capacity. New crushers, screens, belt-conveyors and elevators were installed; a new river dock and a 1,500-ft. spur track were built.

The Heumader Quarries, St. Joseph, Mo., replaced its plant which was destroyed by fire in the spring of 1933 with a completely new and modern plant of 70 tons per hr. capacity. The plant uses Diesel-engine power.

The National Lime & Stone Co. enlarged and improved its fine-reduction plant at Carey, O. A Bartlett-Snow drier, vibrating screens and other equipment was installed.

The Buffalo Crushed Stone Co. completed a large new plant near Buffalo, N. Y. The equipment includes Robins belt-conveyors and Gyrex screens.

Sand-and-Gravel Industry Adds Little to Productive Capacity in 1933

Most of the Expenditures Made Are Devoted to the Improvement of Existing Facilities

THE sand-and-gravel industry in 1933 as a whole produced about the same amount of material as in 1932 but there the comparison stops. The year 1933 ended on an upward trend, due largely to C. W. A. work, and the prospects of tremendous aggregate requirements for P. W. A. work beginning early in the spring have created a spirit of optimism which was entirely lacking a year ago. All business indicators point to 1934 as a year in which the demand for sand and gravel will be much greater than in either 1931 or 1932.

Portable sand-and-gravel plants got an even larger proportion of the existing business than in the previous year, mainly because of the fact that much of the highway construction done was on secondary roads, in many cases out of the profitable shipping territory of established stationary plants. As a growing number of established producers are now operating portable plants to supplement their fixed units, however, and much of this business went to these plants, a smaller proportion of business of this kind was actually lost than in recent years.

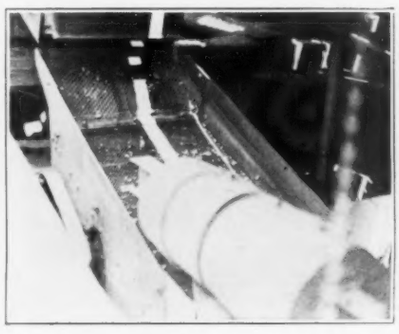
Prices reached a more reasonable level toward the last of the year, due largely to the code of fair competition now in force and the steps being taken both by the government and the industry against price-cutting. This alone is a large step toward profitable operation for many plants which have been unable to earn expenses.

Insufficient data are available for any definite comparisons to be made but indications are that there was some decrease in new plant construction during the year. This was more than offset in expenditure by the considerable increase in plant improvements. Much of this work is under way at present in anticipation of the coming season's demand.

In past years there have been instances from time to time where gold has been found in commercial sand-and-gravel deposits and in a few cases it was present in sufficient quantities to pay more than the cost of reclamation. When the price of gold was raised, however, reports of such sidelines became numerous, most of them coming from California, Nevada, Indiana and Illinois. Among these operators is the Perkins Gravel Co., Perkins, Cal., which recently put in operation a new gravel plant with apparatus for reclaiming the gold in the deposit. The Los Angeles Rock & Gravel Co., Los Angeles, Cal., is also reported to have installed gravel-handling equipment near Goldfield, Nev., for reclaiming gold from placer deposits. With the present high price of gold it might pay other producers, located in regions where gold is known to exist, to investigate the possibilities of what might turn out to be a profitable sideline for them.

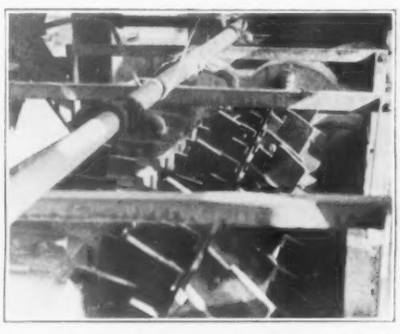
Lake Erie Mining Co.—A small but unusually interesting sand-and-gravel plant was put in operation during the summer of 1933 by the Lake Erie Mining Co., Peoria, Ill. This company had attracted the attention of the industry in 1932, when it opened one of the most advanced concrete-batching plants in existence. The new gravel plant was built alongside the existing concrete plant and storage facilities and furnishes all the aggregates for them. It has a capacity of 40 tons per hr. The unusual features are its location near the down-town section of the city and the fact that raw material is hauled a considerable distance through the streets of the city to the plant by trucks. A complete description of this plant is published elsewhere in this issue.

C. C. Beam, Inc.—A new sand-and-gravel plant began operations early in 1933 at Sligo, O. It is operated by C. C. Beam, Inc., of Melvin, producer of crushed stone and sand and gravel. The

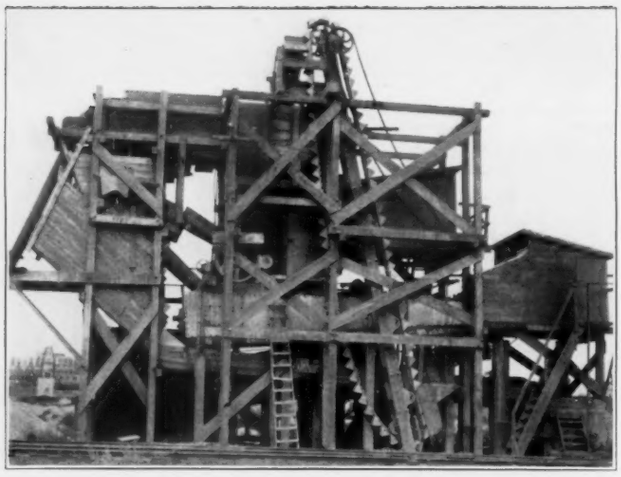


Vibrating screen in new washing plant of Springfield-Pekin Sand & Gravel Co.

New gravel plant of C. C. Beam, Inc., with excavator tower at left.



Heavy-duty log-washer in the Springfield-Pekin plant for removal of clay.



The new washing plant of the Springfield-Pekin Sand & Gravel Co. with dredge line at left.

plant has a capacity of 50 tons per hr. and covers a ground space of only 400 sq. ft.

The deposit contains about 15 per cent clay, 40 per cent sand and 45 per cent gravel. Three sizes of gravel and two sizes of sand are produced, the gravel meeting Ohio State Highway Department grading requirements for No. 4, No. 46 and No. 6 gravel.

The gravel is elevated to a bin at the top of the plant, from which it is fed by a reciprocating-plate feeder into a 60-in. by 12-ft. Allis-Chalmers revolving combination scrubber and scalping screen. The "rejects" from this are dropped into a 6-in. Superior-McCully reduction crusher, from which they are reëlevated to the scrubber. The "throughs" pass over a 3-deck Allis-Chalmers vibrating screen, each deck of which is supplied with two sets of sprays which wash the clay from the gravel.

The self-unloading boat Dolomite No. 1 shortly after launching.

The No. 4 and No. 46 gravel are conveyed to storage-piles by an 18-in. by 60-ft. pivoted-belt conveyor. The No. 6 gravel is dropped into a steel bin from which it is conveyed to storage by motor trucks.

The bottom deck of the vibrating screen is covered with a ⅛-in. mesh wire cloth. The "throughs" are washed into a sand classifier, which it an interesting part of this plant. It consists of two settling tanks, one being suspended over the other. The upper tank is divided into three compartments, each of which is provided with an adjustable opening through which the sand can be discharged into the lower tank. The first of these compartments is so arranged that the coarse sand which settles in it can be washed through a waste-pipe, and only the finer sands in the last two compartments drop into the lower tank. When making concrete sand the material in all three compartments is allowed to pass into the lower tank, but when making mason's sand the material which settles in the first compartment is wasted. The second settling tank is an ordinary single-screw classifier, and is built around a 16-in. screw manufactured by the Columbus Conveyor Co. The screw dewaters the sand and drops it into a steel bin from which it is conveyed to storage by trucks.

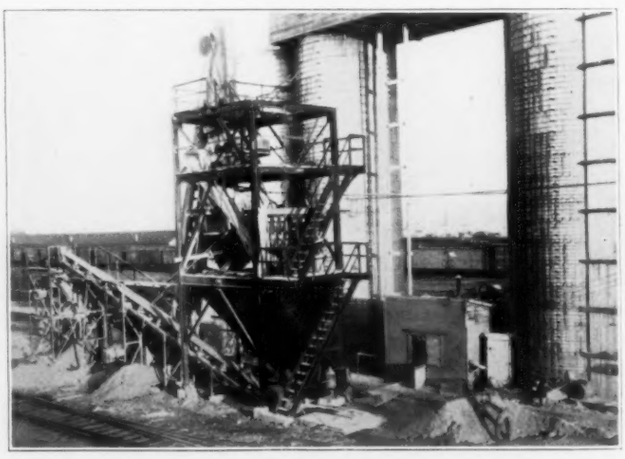
When the plant was first put into operation the material was elevated to the top of the plant by a drag-line, but the pit being dry and the deposit of a sticky nature, it was found difficult and expensive to excavate by this method. Consequently, a 1-cu. yd. Massilon steam shovel was installed, the material being conveyed to a hopper at the foot of a bucket-elevator by motor trucks. The material is fed to the elevator by a 24-in. continuous-pan feeder operated from the foot shaft of the elevator. The elevator and pan feeder were furnished by the Webster Mfg. Company.

Water for washing the gravel is obtained from a small creek and is pumped by a Fairbanks Morse 6-in. centrifugal pump operated by a 50-hp. motor.

Finished products are loaded from storage into trucks by a Barber-Greene loader. The steel frame for this plant was designed and erected by the Champion Bridge Co. of Wilmington, O.

California Rock & Gravel Co.—The new rock, sand and gravel plant of the California Rock & Gravel Co. was put in operation in March, 1933. This plant is located on a 165-acre property at Eliot, Cal., between Pleasonton and Livermore. It has a present capacity of 150 tons per hr, and is so constructed that it can be enlarged at any time at a nominal cost.

The material is loaded by a 1¾-cu. yd. 50B Bucyrus electric shovel which discharges it into an 8-cu. yd. steel field hopper. A reciprocating feeder discharges it to a field belt-conveyor which is 300 ft. long and is built in portable sections. This discharges to a Bodinson 5-ft. by 20-ft. spiral tubular washer having at its discharge end a conical screen which has 1¾-in. and 3-in. openings. The minus 1¾-in. material goes to a reciprocating



The new sand-and-gravel plant of the Lake Erie Mining Co. alongside storage-silos.

washer for further cleaning. The plus 3-in. material goes to a 13-in. Allis-Chalmers McCully crusher. The intermediate size goes direct to a hopper over the main conveyor, where it is joined by the other two sizes.

A belt-conveyor feeds from the hopper to the top of the preparation plant, where it discharges on an Allis-Chalmers double-deck vibrating screen. The intermediate size from this screen goes direct to storage; the top size goes to a second double-deck screen whose three sizes also go to storage. The undersize from the first screen goes to a third double-deck screen whose two large sizes also go direct to storage. The minus ¼-in. material passing through the bottom deck of this screen goes to a drag-line classifier, where the coarser particles are dewatered and delivered by gravity to storage. The overflow from this classifier can be diverted either to waste or to the primary scrubber described above.

A loading conveyor in a concrete tunnel under the storage-bins is arranged to take material from the bins in any desired proportions. This conveyor discharges over a lip screen for additional washing and then through a reciprocating loading chute into cars for shipment. The loading conveyor can also be reversed to discharge any desired size of material to an inclined conveyor which feeds a 200-ton hopper which supplies the main conveyor running to the top of the screening plant. Another optional arrangement is the location of a 7-in. Allis-Chalmers Newhouse crusher to receive material direct from the bins containing the two largest sizes. This crusher then discharges to the conveyor feeding the 200-ton bin just mentioned.

The personnel of this company has long been connected with the building industry in California. The officers of the company are: F. N. Woods, Jr., president; F. W. Erlin, vice-president and general manager; C. A. Roller, secretary.

Springfield-Pekin Sand & Gravel Co.—The plant of the Springfield-Pekin Sand & Gravel Co. at Pekin, Ill., exemplifies the changing conditions which a well-designed plant must be prepared to meet in order to remain in existence. This plant was built in 1925 as a straight sand-and-gravel crushing, washing and screening plant using a dredge with a plain nozzle, a revolving scalping screen, a gyratory crusher, and conical screens. This arrangement was satisfactory until 1928, when clay and compacted gravel were encountered in the deposit. First a rotary cutter-head was installed on the dredge, which proved satisfactory for a time but was replaced with a cutting ladder when conditions became worse.

The plant was able to continue without changes until 1932 when a change in highway specifications resulted in the replacement of the original scalping screen by a vibrating screen. Then in the autumn of 1932, the clay in the deposit became a real problem and several methods of removing it were tried without success. Early in the spring of 1933 the present system was installed and has proved entirely satisfactory. The dredge line now empties into a dewatering flume at the top of the clay-washing plant. This discharges to a single-deck Simplicity scalping screen, the oversize from which goes to a McLanahan & Stone single-roll crusher. The "throughs" from the screen and the product of the crusher are fed to a McLanahan & Stone double log-washer which breaks the clay free from the gravel, disintegrating it so that it can overflow to waste. The washed sand and gravel then go to another Simplicity single-deck vibrating screen from which the oversize can be returned to the roll crusher by a bucket-elevator. The finished material is discharged into a concrete sump from which two bucket-elevators take it to the top of the screening plant. No changes have been made in the original lay-out of the plant except that a small Simplicity single-deck screen has been added to insure the complete removal of "fines" from the coarser sizes. The plant has a capacity of 40 carloads of material daily.

Dolomite Products Co., Inc.—One of the interesting developments of the year was the self-unloading boat, Dolomite No. 1, which was launched in October. This boat was designed by John H. Odenback, president of the Dolomite Products Co., Inc., Rochester, N. Y., and built under his supervision by the Dolomite Marine Corp., a subsidiary which also operates the boat. The Dolomite No. 1 is 214 ft. in length and has a cargo capacity of 1,300 tons. It is all-steel in construction and is also all-electric-welded. Two 440-hp. Busch-Sulzer Diesel engines drive the boat and also supply current for lighting and for operation of the unloading equipment. When carrying aggregate, hoppers in the boat discharge to reclaiming belt-conveyors. These empty on an inclined belt-conveyor feeding a 95-ft. boom conveyor on the deck of the boat. This boom can be folded out of the way and is securely fastened down when the boat is not unloading.

The boat is also designed to transport liquids and has just completed a successful commercial trip from Norfolk, Va., to New York City carrying oil for the Standard Oil Co. The boat is docked at Albany, N. Y., where superstructure work is in progress in preparation for aggregate transportation. The boat will operate during the summer on the New York barge canal and the Great Lakes.

A few of the many other new plants and improvements of the year are briefly mentioned below.

T. L. Herbert & Sons, Nashville, Tenn., among the oldest and largest producers in this district, further improved their operations during the year by the installation of a new concentrator plant to clean and separate sand. The sand and gravel are unloaded from barges into a 300-ton hopper divided into two compartments. This bin feeds two Deister Concentrator Co. Overstrom diagonal-deck concentrators, which discharge to a Link-Belt dewatering drag from which the material passes by belt-conveyor to the plant storage.

The Mississippi Aggregate Co., Jones Crossing, Miss., operates a new plant which is unusual in that the individual screens, crusher and elevators are driven by separate gasoline engines.

The Mirabel Gravel Co. has enlarged its plant near Healdsburg, Cal., by adding new screening equipment and bins.

Cement, Lime and Other Industries Look Forward to Improved Business

Better Prices Already Effective and Increased Rate of Production Expected

THE cement industry in 1933 reached the lowest ratio of production to capacity since records have been available, lower even than in 1932, the previous low. Unlike those for 1932, however, the prospects for the coming season have created a spirit of optimism among producers which seems to have valid reason for existence. Prices are much better than they were in 1932 and early in 1933 when, in some sections of the country, they reached the lowest point in the history of the industry. A constantly-growing number of producers have been able to bring their operations out of the "red."

Prospects for better 1934 business are based largely on the huge purchases of cement for P. W. A. projects which will begin early in the spring and in anticipation of which many plants are now operating to fill their cement- and clinker-storage facilities. Several plants which had been shut down for over a year are now in operation. Not only will a large part of the original $3,300,000,000 fund appropriated for P. W. A. projects be spent for cement but further appropriations of $1,600,000,000 are expected for this work. Slum-reclamation projects, railroad-improvement programs and other work of this nature financed by government loans should provide the impetus needed for the building-construction industry to resume its rightful place as an important market for cement.

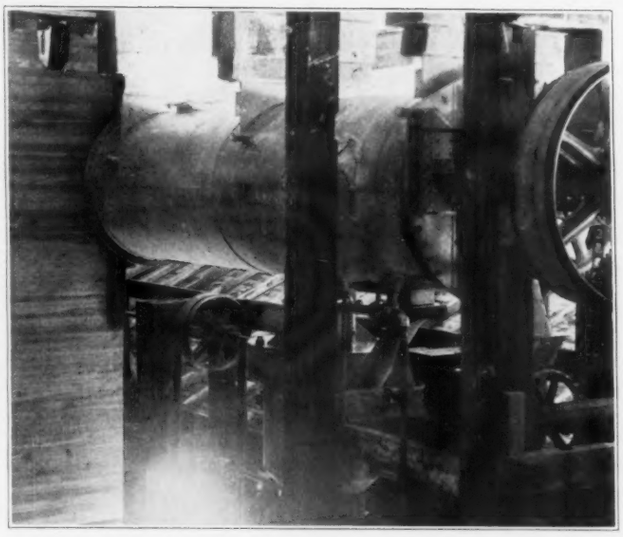
For the fourth consecutive year no new plants were built although several are contemplated. Improvements to existing plants, as in 1932, were again made with the purpose of increasing plant efficiency and reducing the cost of production. Indications are that this will again be the case in 1934 as sentiment in the industry is still definitely against any increase in capacity. Several extensive improvement programs which call for expenditures of over a million dollars each are now under way, and it is widely known that several other companies are contemplating programs of even greater magnitude.

As usual it was rumored that a number of state and even government-operated plants would be built, but none of these has matured. A cheering note was the definite abandonment of the Michigan state cement plant which is now on the market as junk. It is said that this plant cost the taxpayers of the state over $1,000,000 above the amount for which the cement produced could have been purchased on the open market.

Alpha Portland Cement Co.—A year ago the Alpha Portland Cement Co. started on a program of improvements at its plant at Catskill, N. Y., which involved a complete rebuilding of the stone-crushing, stone-drying and clay-drying departments. This change was accomplished between Nov. 1, 1932, and June 1, 1933, giving over six months' employment to approximately 100 men, in addition to those normally required for plant maintenance during shut-down periods.

Following a short operating season of four months in 1933, the reconstruction work was resumed on Oct. 1 and is now under way. The raw-grinding department is being completely rebuilt and a Babcock & Wilcox roller-bearing mill is to be installed in place of the ball- and tube-mills formerly used. The kiln department is undergoing reconstruction, involving rebuilding one of the kilns

The plant of the Michigan Silica Co. viewed from the working quarry face. Primary crusher building in foreground.



Continuous hydrator in plant of Ripplemead Lime Co.

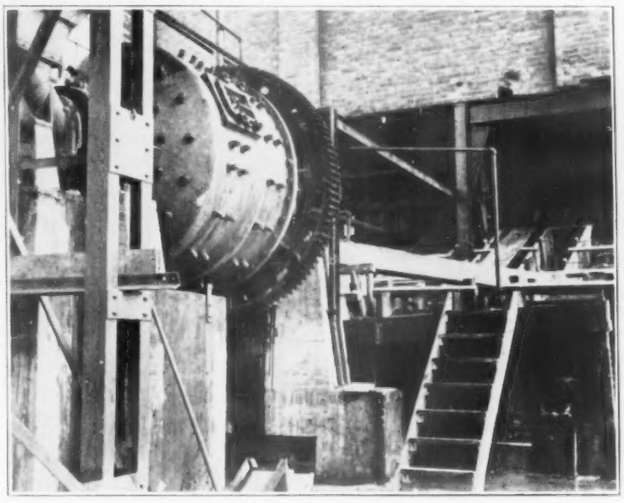
and renewing the kiln building and extending it to provide for the installation of clinker-coolers of the shaker type to be furnished by Allis-Chalmers. The steel flues connecting the kilns with the waste-heat boilers will be replaced with concrete flues lined with brick, and the boilers will be equipped with new and larger superheaters to improve the quality of steam produced. The main power unit of the plant, a 3,000-kw. Westinghouse turbo-generator, which was installed in 1916, is being reconditioned by replacing the steam end with a modern turbine designed to develop the best possible efficiency. This work will give six months' employment to about 250 men, considerably in excess of the number of men employed at the plant during normal operations. With the hours of work limited to 36 per week, the available work is being spread among as many men as possible.

The construction program outlined above will cost approximately $500,000, but when it is finished the Alpha company will not only have a modern cement plant, but will also have the satisfaction of knowing that its reconstruction program was carried out at a time when it was of considerable benefit to the community which it serves.

Other Cement Improvements.—The Santa Cruz Portland Cement Co., late in the year began the construction of facilities for water shipment of cement which will cost over $1,000,000 before the work is completed. At the plant near Santa Cruz, Cal., a 2,500-ft. dock for loading ocean vessels is under construction. Silos at the shore end of the dock will load cement to the boats through a pneumatic conveying system. Additional storage-silos will also be erected at several distributing points. An ocean steamer has been purchased and is being converted into a self-unloading boat at an eastern shipyard. These improvements will make it possible for the first time to make direct water shipments from this pioneer California plant whose site overlooks the Pacific Ocean.

The Huron Portland Cement Co. late in the year completed a new cement-storage and bagging plant at Oswego, N. Y., to distribute cement received in bulk by self-unloading boats. The structure consists of 6 silos with a total storage capacity of 75,000 bbl. Shipments can be made from this new distributing point by railway, highway, canal or lake.

The Dewey Portland Cement Co., Kansas City, Mo., which in recent years has made a number of important improvements in its two plants, is erecting a new clinker-storage building with a 71½-ft. span, 10-ton overhead electric crane with a 3-cu. yd. clam-shell bucket.



Another view of the scrubber showing V-belt and gear drive.

The San Antonio Portland Cement Co., San Antonio, Tex., made a number of improvements, including the installation of two Lee process clinker-coolers on its two 200-ft. kilns. A 16-ft. Raymond separator was also installed for making super-cement.

The Kosmos Portland Cement Co. started on an extensive improvement program. The locomotive-haulage system in the quarry was replaced by three new Mack trucks equipped with Easton bodies. A number of Hardinge constant-weight feeders for clay clinker and gypsum were installed. Two Vanderwerp recuperators have been purchased for the two 125-ft. kilns and several Roto-Clones are to be installed.

Changes in Lime Plants.—The situation in the lime industry was improved to some extent in 1933 by the activity in the glass and steel industries. The demand for chemical lime was also good and the development of a number of new uses for lime helped to make the future prospects of the industry look good for the first time since 1926 or 1927. The demand for dolomite refractories in the steel industry showed a sharp increase and a number of lime producers installed equipment for the production of this material. Coöperative effort on the part of the industry is also showing signs of recovering some of the markets lost to competitive products during recent years. Prices were adjusted late in the year to a reasonable level, due to the operation of a code of fair competition, and to a new spirit of

coöperation in the industry which has ended the price-cutting and other short-sighted policies of former years.

The Ripplemead Lime Co., Ripplemead, Va., during the summer completed a new hydrate plant. This plant operates four vertical kilns with a capacity of from 24 to 30 tons daily. The raw lime intended for the hydrate plant is first passed through an Allis-Chalmers Pulverator. An elevator supplies a 5-ton bin from which a feeder discharges to the Kuntz horizontal-type continuous hydrator. The hydrated lime goes to a Sturtevant separator before being sacked.

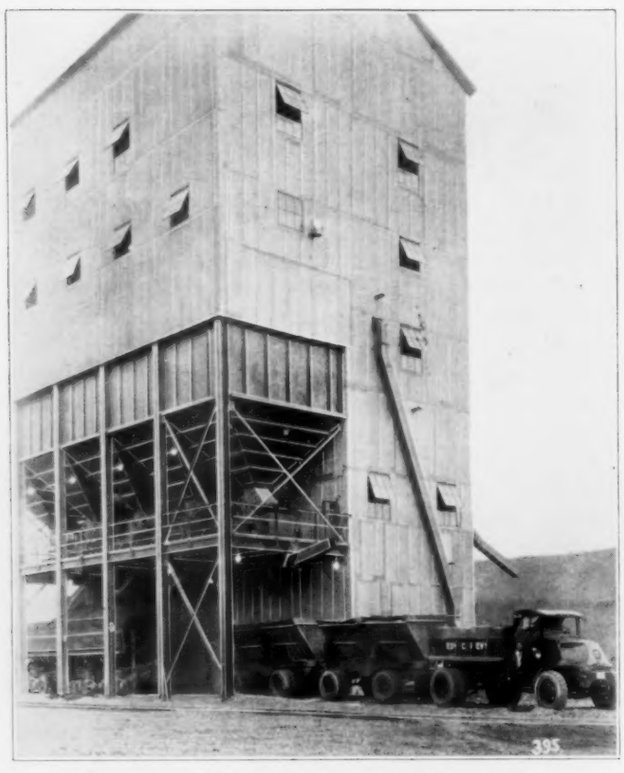
The Louisiana Lime Products Corp., Shreveport, La., has completed the construction of a new crushed-stone plant at Easton, La., and is progressing rapidly with its lime plant at the same location. The crushed-stone plant has a capacity of about 30 tons per hr. and uses an Allis-Chalmers 3-deck vibrating screen, electric motors and a Pulverator, and Jeffrey belt-conveyors and elevators. The lime plant, which will also be modern, will have a capacity of 50 tons per day.

The new rotary-kiln dolomite-roasting plant of the Kelley Island Lime & Transport Co., at Clay Center, O., went into operation. This plant uses the latest in grinding and handling machinery and is of all-steel and concrete construction.

Other Industries Improve Methods.—The other nonmetallic-mineral industries, among the most important of which are rock asphalt, gypsum, slag, silica sand, feldspar, salt, phosphate rock, etc., with few exceptions ended the year in a position better than that of the previous year. Prices have been raised to a point where most of these industries can show a profit at the increased capacities promised for 1934. Numerous new plants were built or are now under construction and many improvements are under way in anticipation of a better year.

The most important development in the slag industry during 1933 was the erection of the new plant of the Great Lakes Steel Corp., Hanna Furnace Division, which went into operation late in November. This plant is located at Zug Island, near the center of the industrial area of Detroit, and is ideally located for truck, train or boat shipments. Simplicity is the keynote of this plant, which was designed and constructed under the supervision of the company's engineering department and erected by its own mechanical and electrical forces. It is entirely of concrete-and-steel construction and was designed for a capacity of 100 tons per hr. It is unusally flexible in design to meet the widely-varying specifications prevailing in the territory it serves.

Slag is obtained from the two blast-furnaces operated by the company on Zug Island. After being cooled in pits the slag is removed by a shovel and hauled in cars to the plant, where it is discharged into a track hopper. A plate-feeder and pan-conveyor discharge the material to a single-deck vibrating scalping screen. Oversize material goes to a gyratory primary crusher whose product, with the "throughs" from the screen, are fed to a bucket-elevator which feeds a short belt-conveyor fitted with a magnetic pulley to remove any iron. The slag is discharged to a double-deck secondary scalping screen, any oversize going to a cone secondary crusher. "Throughs" from the screen and



Slag plant of Great Lakes Steel Corp. showing cars and trucks being loaded.

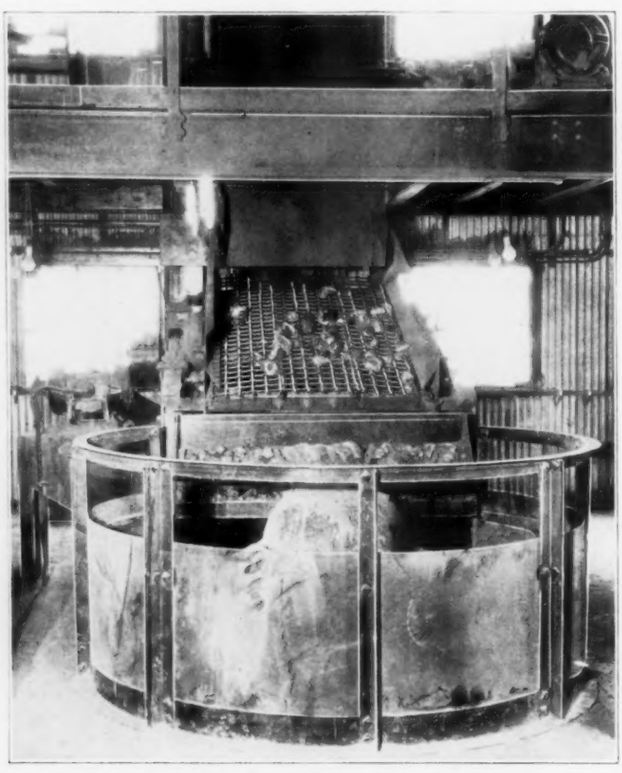


Plate feeder and scalping screen discharging to primary crusher at Great Lakes plant.

crusher go to another bucket-elevator which discharges on a double-deck sizing screen provided for coarse separation. Two sizes go direct to storage and the "fines" by a short belt-conveyor to a double-deck finishing screen whose three products go to separate bins.

The storage consists of five steel bins which discharge on a horizontal belt-conveyor which can be used for loading either straight or mixed sizes into cars or trucks. All truck shipments are weighed on a truck-scale at a modern office near the plant.

Michigan Silica Co.—The Michigan Silica Co., Rockwood, Mich., is another company which had the foresight to make improvements to its plant while they could be made at the lowest cost in years. These improvements were completed just in time to enable the company to take advantage of the increased demand for glass sand created by the return of beer and intensified with repeal of the 18th Amendment. During the winter and early spring a second rotary drier, a new Hardinge conical scrubber and other equipment was installed. During the summer of 1933 the scrubber was moved to a new position and six Link-Belt dewatering screws installed. The mill building was also enlarged to make room for this equipment. These improvements, together with others made in 1927, make this plant one of the most modern silica plants in operation and make possible a product clean and well-graded enough for optical-glass manufacture.

Even the stripping at this plant is done in an efficient manner. A Thew-Lorain shovel loads Mack trucks which haul the material to the waste dump, where the fill is leveled by a Caterpillar tractor with a La-Plante-Choate bulldozer. In the quarry the stone is loaded by another Thew-Lorain shovel into trains of Easton quarry cars drawn by two Plymouth locomotives. A car-haul chain takes the cars one at a time up the incline to the crusher building, where their contents are dumped into the Buchanan primary jaw crusher, and then down another incline where they are again picked up by the locomotives.

A belt-feeder and a conveyor take the stone to the top of the quarry to a steel storage-tank. Another belt-conveyor feeds from this tank to a series of two Tyler Hum-mer screens. Their "rejects" go in a closed-circuit to a Lewiston Chilean mill fitted with sprays and by bucket-elevator back to the screens. The washed sand goes to a Dorr bowl-and-rake classifier which feeds a Hardinge conical scrubber whose product goes to six Link-Belt dewatering screws. The sand is then pumped to storage, where it is allowed to drain before being rehandled by a crane to the drier-feed bins. The two Ruggles-Coles oil-fired driers discharge to a series of belt-conveyors and bucket-elevators running to a concrete dry-storage tank. For shipment a bucket-elevator feeds four Tyler Hum-mer screens which discharge over a Dings Type X magnetic separator which removes any metal. Another elevator handles the sand to a loading bin.

J. Irving Crowell, Jr., during the year put in operation a new fluorspar screening and refining mill at Beatty, Nev., which has a capacity of 30 tons per day. Dump trucks are used to haul the raw material to the mill.

The Santa Rosa Rock Asphalt Co., Santa Rosa, N. M., put in operation a large and modern plant, after several years of testing of deposits. Both impregnated sandstone and limestone are processed for road material. Power is supplied for the plant by a complete Diesel-driven power-plant and a complete plant laboratory is maintained to insure a uniform product.

The Muscovite Mica Mining & Milling Co., Guernsey, Wyo., completed a plant for the commercial production of scrap and sheet mica. The equipment includes crushers, rolls, screens, conveyors, etc.

The United States Gypsum Co. completed the construction of its new wall-board plant near its existing plant at Midland, Cal. This unit has a capacity of 100,000 sq.ft. of wall-board daily. The company also made additions to its plant at New Brighton, N. Y.

The Southern Alkali Corp., Corpus Christi, Tex., is building a $10,000,000 alkali plant for which much of the important equipment has already been purchased.

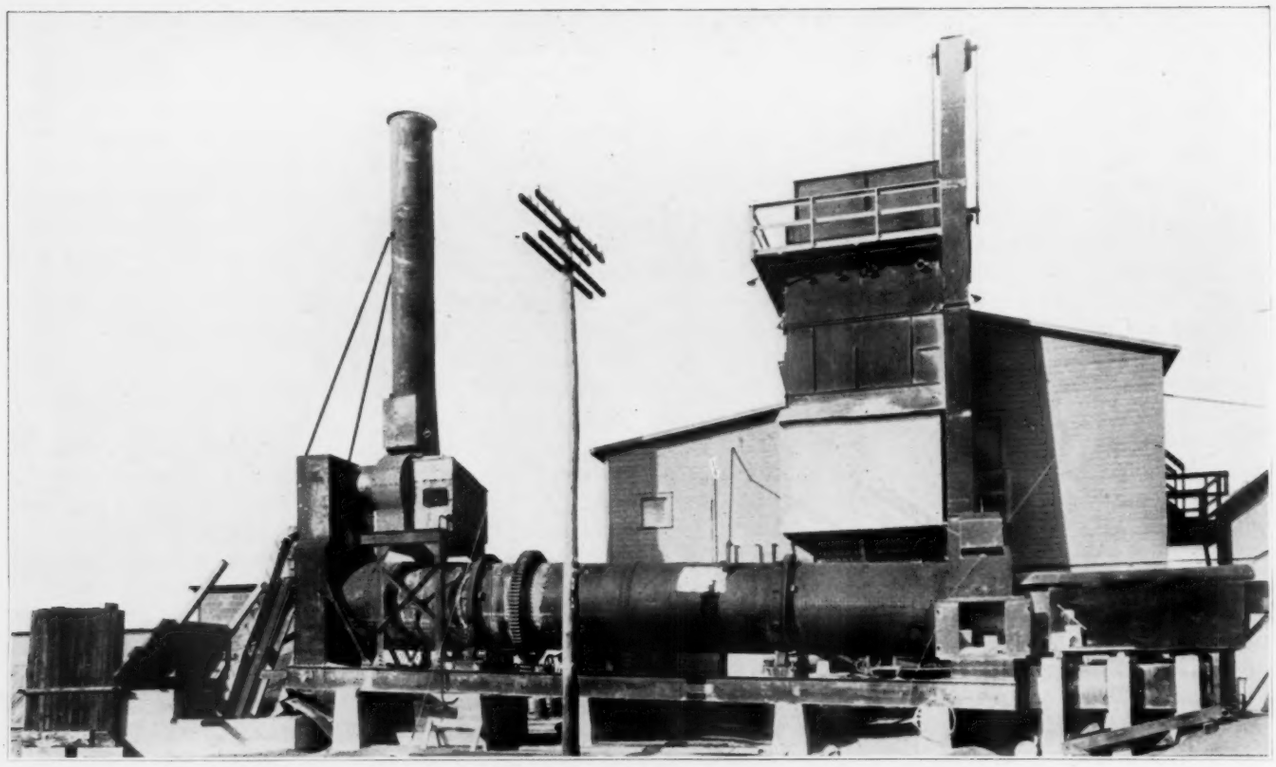
December Construction Contracts

Contracts for construction projects of every description placed during the first half of December totaled $122,877,200 in the 37 eastern states according to figures of F. W. Dodge Corp. This total for the half-month was more than 50 per cent. larger than the total reported for the entire month of December, 1932. In addition the figures were more than 70 per cent. ahead of the total reported during the first half of November, 1933.

Residential building contracts placed during the first half of December totaled $13,629,200, as against $12,957,500 for the entire month of December, 1932. For public works and utilities contracts were almost twice as large as the total reported during all of December last year, while for non-residential building the total of $25,423,100 for the first half of December compares with $24,944,900 for the entire month of December, 1932.

The contract volume of $162,330,600 reported for the 37 eastern states during November was almost 12 per cent. larger than the total shown for October and almost 55 per cent. ahead of the contract volume registered for November, 1932.

Of the November construction total about $127,000,000 was for publicly-financed construction, while the remainder represented privately-financed undertakings. The publicly-financed construction awards during November were almost seven times as large as the total for this class of work shown during April of this year when such work was at its lowest ebb. It is of interest, however, to note that though public work has been largely responsible for the recent increases in construction awards generally there has been measurable improvement also in privately-financed construction projects as contrasted with a year ago.



The Watertown, N. Y., bituminous-mixing plant of the General Crushed Stone Co., one of nine such plants operated by that concern.

Producers of Aggregate Show Increasing Tendency to Widen Activities

Treating Products with Bituminous Mixtures Receives Major Attention

ONE of the most marked tendencies of the year was the number of aggregates producers who entered into the manufacture of bituminous paving materials, an industry heretofore left largely to contractors. This trend shows every indication of growing and has a number of good reasons for existence. Perhaps the most important is the increasing preference in many states for bituminous pavements, especially for secondary-highway construction. The development of mixtures which can be stored indefinitely and shipped any reasonable distance and the search for outlets for waste materials and other sizes for which there is little demand also had some influence.

Aggregates producers also are capitalizing on the fact that they are in most cases the logical producers of such materials. Aggregate plants are in many cases ideally situated for the distribution of such products for either city or country paving. The fact that bituminous mixes use some of the waste products of a plant and that other sizes are supplied without intermediate profits or handling charges gives the aggregates producer an important price advantage over other types of bituminous-plant operators.

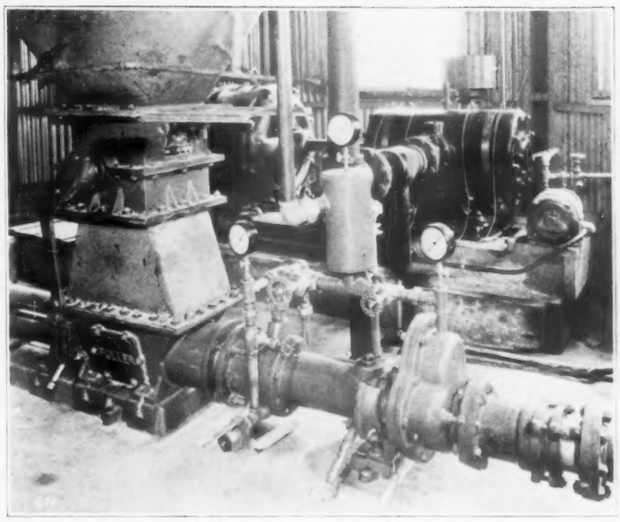
The tremendous drop in building construction during the past few years has resulted in a considerable slowing down in the expansion of the premixed-concrete industry. Most of the new plants built have replaced older obsolete plants or have been erected in localities where no such plants have previously existed. With few exceptions the new plants are of the batch type, the mixing of the concrete being done in truck mixers. The use of portable batching plants in combination with truck-mixers is also increasing in popularity for highway and other construction work in sections where the erection of permanent plants would not be justified.

General Crushed Stone Co.—The General Crushed Stone Co., Easton, Pa., was one of the first to realize the possibilities of bituminous pavements and pioneered in the development of this industry. At present this company owns 9 plants of this type in addition to the 14 aggregate plants it operates in New York, Pennsylvania and Massachusetts. All these 9 plants are cold-mixing units and most of

them are operated alongside the aggregate plants from which they secure their materials. The plants at Watertown and Horseheads, N. Y., were put into operation in 1933 and the one at Akron, N. Y., was completely rebuilt during the year.

Both the new plants are 2-ton Cummer units of the latest design. They are practically identical in operation, except in the manner in which the raw material in handled. At Horseheads there is no suitable supply of aggregate available so this is shipped in already dried in special covered cars from one of the company's aggregate plants. At Watertown the material is taken direct from the aggregate-plant bins and put through a drier before going to the asphalt plant.

Ottawa Asphalt Co.—During the past summer the Ottawa Asphalt Co., a subsidiary of the Ottawa Silica Co., of Ottawa, Ill., completed a plant for producing cold-mixed asphalt road-surfacing material by the Colprovia process. Two grades are produced; coarse or base mix and the surface or topping coat. In both a pure silica sand is used, which produces a smooth, non-skid surface. The plant was built and equipped by Stephens-Adamson Mfg. Co. and consists of a receiving and storage unit, a batching and mixing plant, and the system of conveyors for loading the cars. Hard-rock asphalt is weighed, pulverized and carried by air to a cyclone above the batching plant. Liquid asphalt is pumped to a second compartment. Coarse aggregate is unloaded from cars and is carried by a belt-conveyor and a bucket-elevator to a large cylindrical bin, from which it is reclaimed and conveyed to the batching plant bin by a belt-conveyor and the aggregate-storage elevator. Dried and pulverized silica sand (99.89 per cent pure silica) is received in box-cars from the near mills of the Ottawa Silica Co. and is carried by a screw-conveyor and a bucket-elevator to a second cylindrical storage-bin having a live-storage cone inside the top. Another inclined S-A screw-conveyor



Pneumatic conveyor pump and rotary air compressor at one of the Golden Gate cement-batching plants.

carries the pulverized filler up to the weigh-hopper.

Batches are proportioned by means of three scales—aggregates by a 4-beam scale, liquid and pulverized rock asphalt on a 2-beam scale, and silica sand on a dial scale. The mixed batches are discharged direct from the mixer into a loading hopper and are carried by a belt-conveyor to the car-loading shuttle conveyor. The mixture is shipped by railway and is spread cold for surfacing highways. It can be stock-piled almost indefinitely without setting, until it is laid and subjected to the kneading and oxidizing action of traffic.

Pacific Coast Aggregates Co.—The most important development in the premixed-concrete industry, and undoubtedly one of the most interesting, is the facilities constructed for the handling of cement and aggregates for the construction of the Golden Gate bridge across the bay at San Francisco, Cal.

The bituminous-mixing plant of the Ottawa Asphalt Co., a subsidiary of the Ottawa Silica Co., at Ottawa, Ill.

This project involves the placing of 400,000 cu.yd. of concrete, which is being batched at two plants, operated by the Pacific Coast Aggregates Co., one at each end of the bridge. Both plants have substantially the same handling equipment except that the Marin plant has more storage capacity.

At the plant of the Pacific Portland Cement Co., Redwood City, Cal., the cement is pumped to 2 bins. Fuller automatic-weighing batchers weight the cement before it is pumped to barges of the deck type. At the Marin plant cement can be unloaded at one side of the wharf and aggregates at the other. Barges are unloaded with a portable Fuller-Kinyon pump, which discharges to a 2,000-bbl. storage-bin. A 6-in. Type F, low-pressure pump of the same make conveys the cement either to two 250-bbl. bins above the batchers or to a second 2,000-bbl. bin. The latter serves as additional storage and cement can be recovered from it with the same portable pump used for unloading the barges.

The Fort Point plant on the San Francisco side of the bay uses substantially the same arrangement except that the storage capacity is limited to the 2 large bins over the batchers. The portable Fuller-Kinyon pump discharges from the barges to a bin over a 6-in. low-pressure pump which relays the cement to storage. The use of this relay system of pumping is said to increase the speed of unloading.

J. K. Davison & Bro.—An interesting new premixed-concrete plant of the year is that of J. K. Davison & Bro., Pittsburgh, Pa., which went into operation early in 1933. Like most of the more recent new operations in this field, this plant batches the concrete ingredients which are mixed in truck-mixers in transit to the job. The plant is located on the waterfront of Allegheny River near the main business section of the city and alongside an existing aggregate storage-bunker which is supplied by barges.

Cement batching plant of J. K. Davison & Co. showing mixer truck being loaded.

Mixer-trucks are loaded with batched aggregates under these bins and are then "spotted" at the cement-batching plant for loading with the required amount of cement and water. Cement is unloaded from cars and stored in sacks. These are dumped as required into a hopper which supplies a screw-conveyor and an elevator which feeds an automatic batching device from which the material is discharged into trucks.

Other developments in the premixed-concrete field include the following:

The Whittemore Sand & Gravel Co., Cambridge, Mass., installed a batching plant and purchased mixer-trucks for the production of ready-mixed concrete.

A cement-blending plant was installed at Boulder Dam, Nev., to blend the various cements used in the construction of the dam to insure an even color and texture.

Storage facilities and batching plant for the Golden Gate bridge project on the main side opposite San Francisco.

Organization of Aggregates Industries Under Code Near Completion

Producers in All But Four States Have Met and Selected Representatives

AS the result of hard and patient effort on the part of the Temporary Regional Committees named by the Temporary Code Authority—see pp. 22-23, PIT AND QUARRY, Dec., 1933—the huge problem of organizing the mineral-aggregates industries of America is fast nearing solution. Only two of the sixteen regions into which the country has been divided had not reported at the time of going to press.

In one of these regions—No. 5 (Alabama, Florida, Georgia, Mississippi and South Carolina)—a meeting was held at the Ansley Hotel, Atlanta, Ga., on Dec. 12, but as it was limited in attendance to producers from Georgia, no action was taken with reference to matters affecting the entire region. In the case of the other region—No. 16 (Idaho, Montana, Oregon and Washington)—the great distances between producers has delayed their getting together.

From most of the other regions complete reports have been received and these, together with the incomplete reports from the remaining regions, are given on this and the following pages.

So far as reported, the Code Authority will include the members named below. Where there is no slag production, there is, of course, no slag representative. To these will be added those to be elected in Region 16 and those members-at-large to be elected on January 22, the first day of the Cincinnati conventions.

CODE AUTHORITY

Region	Crushed-Stone	Sand-and-Gravel	Slag
1.	A. L. Worthen	Paul P. Bird	(1)
2.	Otho M. Graves	Anderson Dana	Harris N. Snyder
3.	A. W. Worthington	Alexander Foster, Jr.	W. S. Buckland
4.	L. J. Boxley	W. A. Smoot	Joseph J. Hock
5.	T. I. Weston	H. C. Boyd	C. E. Ireland
6.	H. E. Rodes	H. P. Caldwell	(1)
7.	R. S. Wilson	Robert J. Potts	(1)
8.	H. M. Sharp	F. D. Coppock	W. E. Bliss
9.	E. J. Krause	E. Guy Sutton	L. E. McDermut
10.	A. J. Blair	H. N. Battjes	K. A. Dietrich
11.	C. A. Wagner	S. J. Reader	(1)
12.	R. C. Fletcher	Fred P. Curtis	(1)
13.	John Prince	H. E. West	(1)
14.	M. W. Woodward	F. P. Spratlen, Jr.	Arthur L. Allen
15.	Anson S. Blake	F. J. Twaits	(1)
16.	(2)	(2)	

(1) No slag production. (2) Report not yet available.

News of the Regional Committees

Region 1

Meeting on Dec. 4 and 5, 1933, the registered aggregates producers of Region 1 (New England) elected the following members to serve as the

REGIONAL COMMITTEE

Crushed Stone:

Edward Balf McGurk, Edward Balf Co., Hartford, Conn.
A. L. Worthen, Connecticut Quarries Co., New Haven, Conn. (Member of Code Authority).
Eaton J. Clogher, D. V. Frione Co., New Haven, Conn.
Michael A. Gammino, Providence, R. I.
Arthur S. Lane, John S. Lane & Son, Inc., Meriden, Conn.
Theodore C. Cooke, Lynn Sand & Stone Co., Swampscott, Mass.
Lucien E. Martin, Lewiston Crushed Stone Co., Inc., Lewiston, Me.
J. Norman Welch, Welch & Moynihan Co., Salem, Mass.
Bernard A. McKinney, West Roxbury Trap Rock Co., West Roxbury, Mass.

Sand and Gravel:

Stewart N. Dunning, Atlas Sand, Gravel & Stone Co., Hartford, Conn.
George L. Baldwin, Providence, R. I.
J. W. Washburn, Berkshire Gravel Co., Pittsfield, Mass.
Paul P. Bird, Boston Sand & Gravel Co., Boston, Mass. (Chairman of committee; member of Code Authority).
C. B. Dalton, Maine Sand & Gravel Co., Portland, Me.
J. H. McNamara, Boston, Mass.
Joseph R. Perini, B. Perini, Inc., Framingham, Mass.
R. H. Stevens, Stevens Sand & Gravel Co., Lexington, Mass.
Ovid F. Winslow, Winslow & Cummings, Nashua, N. H.

The region, comprising six states, has been divided into three districts to be supervised by the committees named:

District 1

(Maine, New Hampshire and Vermont.)

Crushed Stone:

A. D. Bridge, Amos D. Bridge's Sons, Inc., Hazardville, Conn.
Lucien E. Martin, Lewiston Crushed Stone Co., Inc., Lewiston, Me.
C. H. Latham, Lynn Sand & Stone Co., Swampscott, Mass.
D. W. Overocker, D. W. Overocker, Inc., Burlington, Vt.
S. E. Rand, S. E. Rand Transportation Co., Portsmouth, N. H.
W. F. Lawes, Robie Construction Co., Inc., W. Manchester, N. H.
H. B. Jones, Wells Lamson Quarry Co., Barre, Vt.

Sand and Gravel:

R. D. Barker, Rutland, Vt.
A. L. Garmon, Manchester, N. H.
Austin E. Page, Lane Construction Corp., Concord, N. H.
C. B. Dalton, Maine Sand & Gravel, Inc., Portland, Me.
Louis Vogel, Vogel & Hafley, Manchester, N. H.
Arthur Whitcomb, Keene, N. H.
Ovid F. Winslow, Winslow & Cummings, Nashua, N. H. (Chairman of committee).

District 2

(That part of Massachusetts east of the eastern boundary of Worcester County.)

Crushed Stone:

J. F. Hatch, Blue Stone Quarry, New Bedford, Mass.
M. McDonough, Malden Crushed Stone Co., Saugus, Mass.
H. O. Robinson, Massachusetts Broken Stone Co., Stony Brook, Mass.
M. J. Finn, New England Crushed Stone Co., West Roxbury, Mass.
E. R. Atwood, Old Colony Crushed Stone Co., Quincy, Mass.
F. J. Long, West Roxbury Trap Rock Co., West Roxbury, Mass. (Chairman of committee).

Sand and Gravel:

Chas. M. Cornell, Boston Sand & Gravel Co., Cambridge, Mass.
W. E. Duncanson, Clematis Brook Sand & Gravel Co., Waltham, Mass.
Frank Generazio, Charles River Sand & Gravel Co., Needham, Mass.

C. A. Crowley, C. A. Crowley Co., Milton, Mass.
J. F. Foley, Montaup Sand & Gravel Co., Swansea, Mass.
Ava M. Noone, George H. Noone Sand & Gravel Co., West Roxbury, Mass.
A. I. Merigold, Whittemore Sand & Gravel Co., Roslindale, Mass.

District 3

(That part of Massachusetts west of the eastern boundary of Worcester County, Connecticut and Rhode Island.)

Crushed Stone:

E. R. Molt, Edward Balf Co., Hartford, Conn.
M. A. Farnham, A. N. Farnham, New Haven, Conn.
Lawrence Robinson, Greenfield, Massachusetts, Broken Stone Co., Greenfield, Mass.
H. C. Lane, John S. Lane & Son., Inc., Westfield, Mass.
Wm. E. Hilliard, New Haven Trap Rock Co., New Haven, Conn. (Chairman of committee).
S. A. Fanning, T. J. Quinn & Son, Inc., Berkeley, R. I.
B. M. Holden, York Hill Trap Rock Co., Hartford, Conn.

Sand and Gravel:

A. I. Newton, Berkshire Gravel Co., Lenoxdale, Mass.
E. T. Nettleton, Certified Sand Co., New Haven, Conn.
George F. Thibodeau, Hagan & Thibodeau Construction Co., Eden Park, R. I.
Arthur Eggleston, Lane Construction Co., Meriden, Conn.
William J. Thornton, Manchester Sand & Gravel Co., Manchester Green, Conn.
G. T. McCarthy, Jr., Seaboard Sand & Gravel Co., Bridgeport, Conn.
Ralph Cipolla, M. A. White, Inc., Providence, R. I.

State committees for only four of the six states comprising the region have been formed:

CONNECTICUT STATE COMMITTEE

Stationary Plants:

John Dunning, Atlas Sand & Gravel Co., Hartford, Conn.
R. J. Reigeluth, C. W. Blakeslee Sons, Inc., New Haven, Conn.
Benedict Holden, York Hill Trap Rock Quarry, Meriden, Conn.

Portable Plants:

C. G. Bridge, Amos D. Bridge Sons, Inc., Hazardville, Conn.
E. J. Clogher, D. V. Frione Co., New Haven, Conn.
W. R. Smith, Lane Construction Corp., Meriden, Conn.

Seventh Member:

J. A. MacDonald, State Highway Commissioner, Hartford, Conn.

MASSACHUSETTS STATE COMMITTEE

Stationary Plants:

P. F. Ayer, Boston Sand & Gravel Co., Cambridge, Mass.
T. A. Lanagan, General Crushed Stone Co., Winchester, Mass.
E. O'Toole, Glacier Sand & Gravel Co., Islington, Mass.

Portable Plants:

P. M. Bianchi, C. Bianchi, Ind., Framingham, Mass.
C. B. Lindholm, Pittsfield, Mass.
Louis A. Perini, B. Perini, Inc., Framingham, Mass.

Seventh Member:

R. W. Coburn, Const. Engr., Public Works Dept., Boston, Mass.

NEW HAMPSHIRE STATE COMMITTEE

Stationary Plants:

Chas. W. Wilson, Maine Sand & Gravel Co., Milton, N. H.
Parker H. Rice, Manchester Sand & Gravel Co., Manchester, N. H.
Louis Vogel, Vogel & Hadley, Manchester, N. H.

Portable Plants:

Wm. F. Lawes, Robie Construction Co., Manchester, N. H.
Arthur K. Whitcomb, Keene, N. H.
Ovid F. Winslow, Winslow & Cummings, Nashua, N. H.

Seventh Member:

F. E. Everett, State Highway Commissioner, Concord, N. H.

RHODE ISLAND STATE COMMITTEE

Stationary Plants:

A. F. Courtois, Courtois Sand & Gravel Co., Central Falls, R. I.
T. J. Quinn & Sons, Inc., Berkley, R. I.
Ralph Cipolla, M. A. White, Inc., Providence, R. I.

Portable Plants:

David Bridge, Amos D. Bridge's Sons, Inc., Hazardville, Conn.
Geo. Thibodeau, Hagan-Thibodeau Construction Co., Eden Park, R. I.
Abner P. Lawton, Lawton Construction Co., Providence, R. I.

Seventh Member:

Chas. L. Woolley, Const. Engr., State Board Public Roads, Providence, R. I.

The slag industry has no producers in the region and therefore no representation on the regional organization.

Region 2

Mineral-aggregate producers of Region 2 (New York state) met at the Hotel Syracuse in Syracuse, N. Y., on Dec. 5 to organize for operation under the code. Of the 269 producers invited to participate, 106 indicated by registering their desire to take part.

Prior to the election of the Regional Committee Otho M. Graves, chairman of the Temporary Regional Committee, conducted the meeting. It was decided that the crushed-stone and sand-and-gravel industries should each elect 8 members who should then choose the ninth member to serve on the Regional Committee. The slag industry was allowed to decide on how many members it should elect. After separate conferences of the three industries the following were elected to serve on the

REGIONAL COMMITTEE

(* Indicates member of Executive Committee)

Crushed Stone:

James Savage, Buffalo Crushed Stone Co., Buffalo, N. Y.
J. R. Callanan, Callanan Road Improvement Co., South Bethlehem, N. Y.
* J. E. Cushing, Cushing Stone Co., Schenectady, N. Y.
J. H. Odenbach, Dolomite Products Co., Rochester, N. Y.
Otho M. Graves, General Crushed Stone Co., Easton, Pa. (Member of Code Authority)
C. A. Powers, Herkimer Quarries, Inc., Newport, N. Y.
Sterling Tomkins, New York Trap Rock Corp., New York, N. Y.
H. W. Patterson, Buffalo, N. Y.
William Dahn, West Nyack Trap Rock Co., West Nyack, N. Y.

Sand and Gravel:

* C. W. Maxwell, Albany Gravel Co., Inc., Albany, N. Y. (Secretary of Committee)
R. W. Eberle, Buffalo Gravel Co., Buffalo, N. Y.
J. I. Goodstein, Goodwin-Gallagher Sand & Gravel Co., New York, N. Y.
E. M. Hammond, Gravel Products Corp., Buffalo, N. Y.
D. Francis Howe, Marchiano Sand & Gravel Co., Inc., Mt. Kisco, N. Y.
G. H. McLeod, Local Sand & Stone Corp., Mineola, N. Y.
J. E. Redmond, Mildman Improvement Corp., Buffalo, N. Y.
Kenneth J. Premo, Massena, N. Y.
* Anderson Dana, Seaboard Sand & Gravel Co., New York, N. Y. (Member of Code Authority)

Slag:

Weston N. Carroll, Buffalo Slag Co., Buffalo, N. Y.
* Harris N. Snyder, Buffalo Slag Co., Buffalo, N. Y. (Member of Code Authority)
* H. E. Rainer, Buffalo Slag Co., Buffalo, N. Y. (Chairman of committee)

The meeting then elected the following:

STATE COMMITTEE

Stationary Plants:

A. G. Seitz, General Crushed Stone Co., Syracuse, N. Y.
E. D. Boylston, Goodwin-Gallagher Sand & Gravel Corp., New York, N. Y.
Sterling Tomkins, New York Trap Rock Corp., New York, N. Y.

Portable Plants:

A. W. Hollenbeck, Central Valley, N. Y.
H. C. Hill, Lane Construction Co., Binghamton, N. Y.
Louis Mayersohn, Albany, N. Y.

Seventh Member:

(Chosen at a meeting of the State Committee on Dec. 8.)
Charles D. MacDonald, Croton-on-Hudson, N. Y.

A subcommittee of the Regional Committee, consisting of Messrs. Eberly, Maxwell and Powers, was appointed to receive suggestions for the division of the region into districts.

At the ensuing meeting of the Regional Committee it was decided that the question of district determination should be left to a group who, working with the proposed districts shown on a map approved by the New York State Crushed Stone Assn. as a beginning, should ascertain the wishes of marketers in those districts. The following men were appointed for this purpose:

Buffalo-Rochester District:

Frank X. Ernst, Buffalo Gravel Corp., Buffalo, N. Y.

Syracuse District:

Francis Owens, General Crushed Stone Co., Syracuse, N. Y.

Utica District:

R. M. Kelley, Eastern Rock Products Corp., Utica, N. Y.

Albany District:

J. E. Cushing, Cushing Stone Co., Schenectady, N. Y.

Metropolitan District:

Anderson Dana, Seaboard Sand & Gravel Corp., New York, N. Y.

Northern District:

W. F. Borrman, Northern Quarries, Inc., Norwood, N. Y.

Region 3

Between 21 and 22 million tons of aggregate production was registered for the Dec. 11 and 12 meetings of the third region (Pennsylvania, New Jersey and Delaware) at Philadelphia. More than 200 producers were present.

The assembled producers selected the following men to serve on the various committees:

REGIONAL COMMITTEE

(* Indicates member of Advisory Committee.)

Crushed Stone:

Samuel M. Shallcross, American Lime & Stone Co., Bellefonte, Pa.
F. T. Gucker, John T. Dyer Quarry Co., Norristown, Pa.
Otho M. Graves, General Crushed Stone Co., Easton, Pa.
John Hill, Great Notch Corp., Newark, N. J.
Robert Lacy, T. C. Hubbert & Co., Wilmington, Del.
Samuel F. Dixon, Lambertville Trap Rock Co., Newark, N. J.
Chas. C. Hartzook, Lime Bluff Co., Harrisburg, Pa.
*I. W. Wortman, Morris County Crushed Stone Co., Morristown, N. J. (First vice-chairman of committee).
A. W. Worthington, Pittsburgh Limestone Co., Pittsburgh, Pa. (Member of Code Authority.)
*William Andrews, Union Limestone Co., New Castle, Pa. (Secretary and treasurer of committee).
H. H. Wagner, Union Quarries Corp., Hummelstown, Pa.

Sand and Gravel:

George Fredericks, Consolidated Stone & Sand Co., Montclair Heights, N. J.
Harry F. Curtis, Curtis & Hill Gravel & Sand Co., Philadelphia, Pa.
R. S. Herbert, Dallenback Sand Co., Milltown, N. J.
D. D. Durland, S. R. Durland Sand Co., Wyoming, Pa.
Joseph F. Burke, Eastern Sand & Gravel Corp., Philadelphia, Pa.
Alexander W. Dann, Keystone Sand & Supply Co., Pittsburgh, Pa.
Howard McCrady, McCrady-Rodgers Co., Pittsburgh, Pa.
*Henry W. Peterson, Strathmann Sand & Gravel Co., Paulsboro, N. J. (Third vice-chairman and assistant secretary and treasurer of committee).
J. M. Wittock, Susquehanna Sand & Gravel Co., Highspire, Pa.
*Alexander Foster, Jr., Warner Co., Philadelphia, Pa. (Chairman of committee; member of Code Authority).
J. P. Eyre Price, Wyoming Sand & Stone Co., Wilkes-Barre, Pa.

Slag:

G. S. Snyder, Buffalo Slag Co., Buffalo, N. Y.
J. E. Cashion, Cashion Slag Co., Butler, Pa.
George J. Frye, Duquesne Slag Products Co., Philadelphia, Pa.
*C. L. McKenzie, Duquesne Slag Products Co., Pittsburgh, Pa. (Second vice-chairman of committee).
C. C. Burgess, Midland Slag Co., Youngstown, O.
George W. Weiss, National Slag Co., Allentown, Pa.
William S. Buckland, Philadelphia Slag Co., Swedeland, Pa. (Member of Code Authority).
Carroll D. Winters, Robesonia Slag Co., Wernersville, Pa.
O. C. Peck, Scranton Slag Co., Scranton, Pa.
Frederick Hubbard, Standard Slag Co., Youngstown, O.
Gilbert M. Sawyer, Temple Slag Co., Temple, Pa.

(The vice-chairman act as chairmen of their respective industry groups of the committee.)

DELAWARE STATE COMMITTEE

Stationary Plants:

A. J. Beste, Sr., A. J. Beste & Son, Wilmington, Dela.
T. C. Hubbert, T. C. Hubbert & Co., Wilmington, Dela.
A. Petrillo, A. Petrillo Co., New Castle, Dela.

Portable Plants:

(None of record in the state.)

Seventh Member:

Warren W. Mack, engineer, Delaware State Highway Dept., Dover, Dela.

NEW JERSEY STATE COMMITTEE

Stationary Plants:

Linus R. Gilbert, Kingston Trap Rock Co., Kingston, N. J.
F. W. Schmidt, Jr., Morris County Crushed Stone Co., Morristown, N. J.
M. C. Pohlkotte, Wagaraw Builders' Supply Co., Paterson, N. J.

Portable Plants:

(None of record in the state.)

Fourth Member:

(To be selected.)

PENNSYLVANIA STATE COMMITTEE

Stationary Plants:

F. T. Gucker, John T. Dyer Quarry Co., Norristown, Pa.
W. A. Bliss, Keystone Sand & Gravel Co., Pittsburgh, Pa.
W. W. Duff, New Castle Lime & Stone Co., New Castle, Pa.

Portable Plants:

E. O. Hughes, Pioneer Materials Co., Kittanning, Pa.
W. C. Hoy, Universal Material & Products Co., Kittanning, Pa.
Watson Bowser, Watson Bowser & Brother, Kittanning, Pa.

Fourth Member:

(To be selected.)

Owing to the fact that there are no portable-plant operators in Delaware and New Jersey, it was agreed to make the state committee in each of these cases consist of three stationary-plant operators and a fourth member. As it was impossible in these states to comply with the code, the legality of these two committees remains to be considered.

Region 4

Producers in the fourth region (Maryland, Virginia, West Virginia and the District of Columbia) meeting on Dec. 11, 1933, elected the following organization:

REGIONAL COMMITTEE

Crushed Stone:

J. A. Rigg, Acme Lime & Stone Co., Alderson, W. Va.
L. J. Boxley, W. W. Boxley & Co., Roanoke, Va. (Member of Code Authority).
Bruce Campbell, Harry T. Campbell Sons, Towson, Md.
M. L. Troxell, M. J. Grove Lime Co., Lime Kiln, Md.
C. C. Janutalo, C. G. Janutalo & Co., Fayetteville, W. Va.
J. W. Stuhl, Liberty Lime & Stone Co., Rocky Point, Va.
John McMahon, McMahon Bros., Inc., Pikesville, Md.
A. R. Couchman, North American Cement Corp., Baltimore, Md.
N. W. Pendleton, Pendleton Construction Co., Wytheville, Va.
C. S. Luck, Jr., Sunnyside Granite Co., Inc., Box 115, West End Station, Richmond, Va.
J. F. Tilley, J. F. Tilley, Inc., Marion, Va.

Sand and Gravel:

Jos. J. Hock, Arundel Corp., Baltimore, Md.
Allan E. Barton, Barton Sand & Gravel Co., Bragers, Md.
P. Y. K. Howat, Capitol Materials Co., Washington, D. C.
Hiram A. Carpenter, St. Mary's, W. Va.
D. R. Bortz, Cumberland Cement & Supply Co., Cumberland, Md.
C. Z. Ruth, Kanawah Sand Co., Parkersburg, W. Va.
John H. Olcott, Northern Virginia Construction Co., Clarendon, Va.
G. C. Graeter, Richmond Sand & Gravel Co., Richmond, Va.
A. B. Rawn, Wilson Sand & Supply Co., Huntington, W. Va. (Vice-chairman of committee).
A. H. Smith, Blanchville, Md.
W. A. Smoot, Smoot Sand & Gravel Corp., Washington, D. C. (Chairman of committee; member of Code Authority).

Slag:

E. L. Wade, Arundel Sand & Gravel Corp., Baltimore, Md.
Joseph J. Hock, Maryland Slag Co., Baltimore, Md. (Member of Code Authority).
A. M. Parker, Smoot Sand & Gravel Corp., Washington, D. C. (Secretary of committee).

MARYLAND STATE COMMITTEE

Stationary Plants:

Joseph J. Hock, Arundel Corp., Baltimore, Md.
Bruce S. Campbell, Harry T. Campbell Sons Co., Towson, Md.
B. W. Gatch, T. B. Gatch & Sons, Rapesburgh Sta., Baltimore, Md.

Portable Plants:

Allan E. Barton, Kate Ave., Western Md. R. R., Baltimore, Md.
E. T. Hayman, Hagerstown, Md.
J. E. Mallonee, Mallonee Bros., Pikesville, Md.

Seventh Member:

Charles Bryant, State Roads Engineer, Baltimore, Md.

VIRGINIA STATE COMMITTEE

Stationary Plants:

C. M. Hunter, Pounding Mill Quarry Corp., Pounding Mill, Va.
G. C. Graeter, Richmond Sand & Gravel Co., Richmond, Va.
Charles Klotz, Virginia Limestone Corp., Ripplemead, Giles Co., Va.

Portable Plants:

R. W. Moore, Staunton, Va.
John H. Olcott, Northern Virginia Construction Co., Clarendon, Va.
N. W. Pendleton, Pendleton Construction Co., Wytheville, Va.

Seventh Member:

Holman Willis, Rockydale Quarries Corp., Roanoke, Va.

WEST VIRGINIA STATE COMMITTEE

Stationary Plants:

A. W. Metheney, Acme Limestone Co., Alderson, W. Va.
W. T. Stump, Standard Sand & Gravel Co., Wheeling, W. Va.
George E. Southerland, West Virginia Sand & Gravel Co., Charleston, W. Va.

Portable Plants:

H. A. Carpenter, St. Mary's, W. Va.
C. G. Janutalo, C. G. Janutalo & Co., Fayetteville, W. Va.
J. F. Tilley, J. F. Tilley, Inc. (Marion, Va.), Bluefield, W. Va.

Seventh Member:

Fred Hubbard, Standard Slag Co., Youngstown, O.

Region 5

[At the time of going to press no report had been received.]

Region 6

Gathered in a meeting in Knoxville, Tenn., on Nov. 28, 1933, and again at Knoxville and at Lexington, Ky., on Dec. 3, aggregates producers of the sixth region (Kentucky, North Carolina and Tennessee) made considerable progress toward completing their regional organization. The following committees and districts were decided upon:

REGIONAL COMMITTEE

Crushed Stone:

Thomas McCroskey, American Limestone Co., Knoxville, Tenn.

W. C. Sparks, Cedar Bluff Quarry, Princeton, Ky.
Collier Cobb, Jr., Cobb & Homewood, Chapel Hill, N. C.
H. E. Rodes, Franklin Limestone Co., Nashville, Tenn. (Chairman of committee; member of Code Authority).
Samuel P. Burnham, Kentucky Consolidated Stone Co., Louisville, Ky.
John I. Foules, Missouri Portland Cement Co., Memphis, Tenn.
W. T. Ragland, Raleigh Granite Co., Raleigh, N. C.

Sand and Gravel:

R. N. Coolidge, Cumberland River Sand Co., Nashville, Tenn. (Treasurer of committee).
W. Jess Brown, Dixie Sand & Gravel Co., Chattanooga, Tenn.
B. V. Hedrick, B. V. Hedrick Gravel & Sand Co., Lilesville, N. C.
Samuel Lawrence, Lawrence Stone & Gravel Co., Raleigh, N. C.
Fred E. Hall, Ohio Gravel Co., Ft. Thomas, Ky.
H. P. Caldwell, Ohio River Sand Co., Louisville, Ky. (Secretary of committee; member of Code Authority.)
W. H. Raymond, W. H. Raymond Contracting Co., Bowling Green, Ky.

KENTUCKY STATE COMMITTEE

Stationary Plants:

J. C. McLester, Ashland Sand & Gravel Co., Ashland, Ky.
T. W. Havely, Central Rock Co., Lexington, Ky.
A. W. Partee, Hopkinsville Stone Co., Hopkinsville, Ky.

Portable Plants:

C. A. Coleman, Ashland, Ky.
H. C. MacNeill, Winchester, Ky.
J. B. McLellan, Bowling Green, Ky.

Seventh Member:

(Name not available.)

NORTH CAROLINA STATE COMMITTEE

Stationary Plants:

P. L. Elliss, Asheville, N. C.
G. D. Monroe, Lillington Stone Co., Lillington, N. C.
W. T. Ragland, Raleigh Granite Co., Raleigh, N. C.

Portable Plants:

Collier Cobb, Jr., Cobb & Homewood, Chapel Hill, N. C.
J. B. Ross, Chapel Hill, N. C.
Nello L. Teer, Durham, N. C.

Seventh Member:

(Name not available.)

TENNESSEE STATE COMMITTEE

Stationary Plants:

R. N. Coolidge, Cumberland River Sand Co., Nashville, Tenn.
A. B. Rodes, Franklin Limestone Co., Nashville, Tenn.
T. L. Herbert, Jr., T. L. Herbert & Sons, Nashville, Tenn.

Portable Plants:

David Brown, Chattanooga, Tenn.
George Fisher, Lenoir City, Tenn.
Boyd Williams, Murfreesboro, Tenn.

Seventh Member:

(Name not available.)

KENTUCKY DISTRICT COMMITTEES

District 1

(That part of Kentucky west of the eastern boundaries of Breckenridge, Grayson, Edmonson, Warren and Allen Counties.)

Crushed Stone:

A. W. Partee, Hopkinsville Stone Co., Hopkinsville, Ky.
W. H. Raymond, W. H. Raymond Contracting Co., Bowling Green, Ky.
(Third member not yet named.)

Sand and Gravel:

T. L. Herbert, Jr., T. L. Herbert & Sons, Nashville, Tenn.
P. A. Yager, River Sand & Gravel Co., Owensboro, Ky.
(Third member not yet named.)

District 2

(That part of Kentucky between Districts 1 and 3.)

Crushed Stone:

T. W. Havely, Central Rock Co., Lexington, Ky.
H. F. Mathis (address unknown).
V. C. Morgan (address unknown). (Elected by Messrs. Mathis and Havely.)

Sand and Gravel:

T. C. L. Nugent, Nugent Sand Co., Louisville, Ky. (Elected by Messrs. Hall and Caldwell.)
Fred E. Hall, Ohio Gravel Co., Ft. Thomas, Ky.
H. P. Caldwell, Ohio River Sand Co., Louisville, Ky.

District 3

(That part of Kentucky east of the western boundaries of Mason, Fleming, Bath, Menifee, Morgan, Magoffin, Breathitt, Lee, Jackson, Laurel and Whitley Counties.)

Crushed Stone:

J. H. Mobley, Olive Hill Limestone Co., Olive Hill, Ky.
H. W. Hillman, Tygart Limestone Co., Lawton, Ky.
D. L. Loven (address unknown). (Elected by Messrs. Mobley and Hillmon.)

Sand and Gravel:

J. C. McLester, Ashland Sand & Gravel Co., Ashland, Ky. (Owner of Ohio River Dredging Co., Inc.).
E. V. Rawn, Ohio River Dredging Co., Inc., Huntington, W. Va. Produces sand for Ashland Sand & Gravel Co., Ashland, Ky.) (Elected by Messrs. Fuller and McLester).

Slag:

W. E. Bliss, Standard Slag Co., Youngstown, O. (Plant at Ashland, Ky.).
T. N. Allyn (address unknown).
G. H. Richardson (address unknown). (Elected by Messrs. Allyn and Bliss.)

NORTH CAROLINA DISTRICT COMMITTEE

(The state comprises a single district.)

Crushed Stone:

R. P. Immel, American Limestone Co., Knoxville, Tenn. (Representing agricultural-limestone interests).
H. E. Eagan, Harris Granite Quarries Co., Salisbury, N. C. (Secretary of committee).
J. E. Ramsey, Harris Granite Quarries Co., Salisbury, N. C. (Chairman of committee).
M. N. Hedrick, Piedmont Quarries Co., Winston-Salem, N. C.
W. T. Ragland, Raleigh Granite Co., Raleigh, N. C.
Nello L. Teer, Durham, N. C.

Sand and Gravel:

F. J. Cloud, W. R. Bonsal Co., Lilesville, N. C.
B. V. Hedrick, B. V. Hedrick Gravel & Sand Co, Lilesville, N. C.
Samuel Lawrence, Lawrence Stone & Gravel Co., Raleigh, N. C.
G. D. Monroe, Lillington Stone Co., Lillington, N. C.
L. C. Kohm (address unknown).

Slag:

G. C. Graeder (address unknown).

TENNESSEE DISTRICT COMMITTEES

District 1

(That part of Tennessee east of a line drawn through Jamestown, Crossville and Pikeville and continued beyond to cross the state's north and south borders.)
Committee elected Dec. 6, 1933, at Knoxville, Tenn.

Crushed Stone:

H. C. Brooks, Central Rock & Sand Co., Kingsport, Tenn.
W. C. Anderson, Southern Limestone Co., Harriman, Tenn.
R. S. Campbell, Watauga Stone Co., Watauga, Tenn. (Chairman of committee).

Sand and Gravel:

W. Jess Brown, Dixie Sand & Gravel Co., Chattanooga, Tenn.
H. S. Covert, Knoxville Sand & Lime Co., Knoxville, Tenn.
R. E. Gettys, Jr., Knoxville Sangravel Material Co., Knoxville, Tenn.

District 2

(That part of Tennessee between Districts 1 and 3.)
Committee elected Dec. 8, 1933, at Nashville, Tenn.

Crushed Stone:

J. M. Gager, Gager Lime Mfg. Co., Chattanooga, Tenn.
A. B. Rodes, Franklin Limestone Co., Nashville, Tenn. (Secretary of committee).
R. F. Overall, Tennessee Cement & Lime Co., Murfreesboro, Tenn.
Boyd Williams, Murfreesboro, Tenn.

Sand and Gravel:

R. N. Coolidge, Cumberland River Sand Co., Nashville, Tenn. (Chairman of committee).
W. L. Hailey, Estill Springs Sand & Gravel Co., Nashville, Tenn.
Humphrey Hardison, W. T. Hardison & Co., Nashville, Tenn.
J. L. Bolster, T. L. Herbert & Sons, Nashville, Tenn.

District 3

(That part of Tennessee west of Tennessee River.)

Crushed Stone:

W. C. Sparks, Cedar Bluff Quarry, Princeton, Ky.
Lee T. McCourt, Fischer Lime & Cement Co., Memphis, Tenn. (Chairman of committee).
A. B. Rodes, Franklin Limestone Co., Nashville, Tenn. (Secretary of committee).

Sand and Gravel:

Lee T. McCourt, Central Sand & Gravel Co., Memphis, Tenn.
J. S. Cooper, Memphis Stone & Gravel Co., Memphis, Tenn.
J. G. Smiley, Smiley Sand Co., Atlanta, Ga.

Region 7

The mineral-aggregates industries of the seventh region (Arkansas, Louisiana and Texas) were well represented at the meeting held in the Adolphous Hotel, Dallas, Tex., on Dec. 7 and 8, 1933. The registered producers in the region numbered 109, divided among the states and industries as follows:

	Crushed Stone	Sand and Gravel	Total
Arkansas	1	20	21
Louisiana	1	20	21
Texas	14	53	67
Totals	16	93	109

At the meeting, which was in charge of Robert J. Potts, chairman, the following were chosen to serve on the

REGIONAL COMMITTEE

Crushed Stone:

R. S. Wilson, Big Rock Stone & Material Co., Little Rock, Ark. (Vice-chairman of committee; member of Code Authority).
Ben F. Dickinson, Big Rock Stone & Material Co., Little Rock, Ark.
J. Rutledge Hill, Gifford-Hill & Co., Inc., Dallas, Tex. (Chairman of committee).
C. C. Johnston, H. & H. Rock Co., Sweetwater, Tex.
J. A. Reilly, The James Stone Co., Corsicana, Tex.
A. E. Morgan, Morgan Construction Co., Dallas, Tex.
W. G. Gray, Palmer, Woolf & Gray, Shreveport, La.

M. A. Altgelt, Servtex Materials Co., New Braunfels, Tex.
E. Eilkel, Servtex Materials Co., New Braunfels, Tex.
H. C. Perry, Southwest Stone Co., Dallas, Tex.
W. F. Wise, Southwest Stone Co., Dallas, Tex.

Sand and Gravel:

John Ingram, Acme Gravel Co., San Antonio, Tex.
Howard Parks, East Texas Gravel Co., Dallas, Tex.
C. O. Harris, Flint Sand & Gravel Co., New Orleans, La. (Secretary and treasurer of committee).
Heyward Green, Green Bros. Gravel Co., Franklinton, La.
H. H. Humphreys, Lutesville Sand & Gravel Co., Pine Bluff, Ark.
H. H. Holloway, Monroe Sand & Gravel Co., Amite, La.
Brown McCullough, Reader Gravel Co., Shreveport, La.
Robert J. Potts, Potts-Moore Gravel Co., Waco, Tex. (Member of Code Authority).
W. E. Sampson, S. & G. Co., Houston, Tex.
J. W. Sanders, Standard Gravel Co., Camden, Ark.

The following state committees were elected:

ARKANSAS STATE COMMITTEE

Stationary Plants:

Ben F. Dickinson, Big Rock Stone & Material Co., Little Rock, Ark. (Chairman of committee).
H. H. Humphreys, Lutesville Sand & Gravel Co., Pine Bluff, Ark.
J. E. Juban, Producers' Gravel & Sand Co., Shreveport, La.

Portable Plants:

Clyde E. Fish, Lincoln Gravel Co., Star City, Ark.
H. L. Dickinson, Newark Sand & Gravel Co., Pine Bluff, Ark.
J. W. Sanders, Standard Gravel Co., Camden, Ark. (Vice-chairman of committee).

Seventh Member:

C. S. Young, Arkadelphia Sand & Gravel Co., Little Rock, Ark. (Secretary of committee).

LOUISIANA STATE COMMITTEE

Stationary Plants:

Walter F. Jahncke, Flint Sand & Gravel Co., New Orleans, La.
H. H. Holloway, Holloway Gravel Co., Amite, La.
J. S. Merriwether, Merriwether Co., Shreveport, La.

Portable Plants:

Heyward Green, Green Bros. Gravel Co., Franklinton, La.
J. F. Calmes, Louisiana Materials Co., Baton Rouge, La.
George Denham, Magnolia Sand & Gravel Co., Magnolia, La.

Seventh Member:

(Not yet elected.)

TEXAS STATE COMMITTEE

Stationary Plants:

J. Rutledge Hill, Gifford-Hill & Co., Inc., Dallas, Tex.
Sid Clark, S. & G. Co., Houston, Tex. (Secretary of committee).
E. Eikel, Servtex Materials Co., New Braunfels, Tex.

Portable Plants:

Calvin J. Cocke, Cocke & Braden, Marshall, Tex. (Vice-chairman of committee).
R. W. Briggs, Fordyce Gravel Co., Pharr, Tex.
Hervey Humlong, H. & H. Rock Co., San Angelo, Tex.

Seventh Member:

A. P. Rollins, Gifford-Hill & Co., Inc., Dallas, Tex. (Chairman of committee).

Division of the states into the following districts has been proposed by the committees appointed for that purpose:

ARKANSAS

District 1

That portion of Arkansas north of a line beginning at Helena, Ark., on the Mississippi state line; thence westerly through Mena, Ark.; and continuing the same course to the Oklahoma state line. This district to include both Helena and Mena, Ark.

District 2

That portion of Arkansas lying south of the southern boundary of District 1.

LOUISIANA

District 1

That portion of Louisiana lying south and east of a line beginning at a point east of Morville, La., on the Mississippi state line; thence southwesterly and west of the Tex. & Pac. Ry., crossing the La. & Ark. Ry. and the Tex. & Pac. Ry. at Simmsport, La.; thence southwesterly, crossing the Tex. & Pac. Ry. midway between Meyers and Rosa, La.; thence southwesterly through Opelousas, La.; thence southwesterly and west of the Tex. & Pac. Ry., crossing the Tex. & N. O. R. R. midway between Rayne and Crowley, La.; thence southwesterly, crossing the Tex. & N. O. R. R. midway between Morse and Riceville, La.; thence southwesterly to the Gulf of Mexico at a point near Cow Island.

District 2

All north and west of District 1 and south and west of a line beginning at a point on the Mississippi state line east of Morville, La.; thence northwesterly, crossing the La. & Ark. Ry. at Chevy Chase, La.; thence northwesterly, crossing the Mo. Pac. R. R. midway between Olla and Standard, La.; thence westward, crossing the T. & G. Ry. at Colgrade, La.; thence northwesterly, crossing the T. & G. Ry. midway between Winnfield and Menefee, La.; thence northwesterly, crossing the C., R. I. & P. Ry. at Tannehill, La.; thence northwesterly, crossing the La. & Ark. Ry. and La. & N. W. R. R. at Chestnut, La.; thence northwesterly, crossing the S., L. B. & S. Ry. midway between Hall Summit and Madden's Spur, La.; thence northwesterly, crossing the La. & Ark. Ry. at McDade, La.; thence southwesterly, crossing the Tex. & Pac. Ry. midway between Whitehall and Caspiana, La.; thence southwesterly, crossing the K. C. S. Ry. at Shamburger, La.; thence westerly, crossing the Tex. & Pac. Ry. at Gloster, La.; thence southwesterly, striking the Texas state line at or near Logansport, La.

District 3

That portion of Louisiana lying north of Louisiana District 2.

TEXAS

District 1

Embracing all the counties west of the west county line of the following: Val Verde, Kimble, Menard, McCullough, Brown, Eastland, Stevens, Young, Archer and Wichita Counties.

District 2

Beginning at the southwest corner of Brown County and embracing all the counties north of the south line of Brown, Mills, Lampassas, Bell, Falls, Limestone, Freestone, Anderson, Cherokee, Nacogdoches, San Augustine and Sabine, and all counties east of the west line of the following counties: Brown, Eastland, Stevens, Young, Archer and Wichita Counties.

District 3

All the counties south of the dividing lines of Districts 1 and 2.

Region 8

Ohio producers of crushed stone, sand and gravel, and slag met Dec. 28, 1933, to build an organization for the eighth region, whose boundaries coincide with those of that state. The following committees were elected:

REGIONAL COMMITTEE

(*Indicates member of Executive Committee)

Crushed Stone:

E. V. Anspach, France Stone Co., Toledo, O.
*H. M. Sharp, France Stone Co., Toledo, O. (Vice-chairman of committee; member of Code Authority).
H. P. Gottron, Gottron Bros. Co., Fremont, O.
Bert Herzog, Herzog Lime & Stone Co., Forest, O.
A. B. Mack, Kelley Island Lime & Transport Co., Cleveland, O.
F. W. Ohlemacher, Kelley Island Lime & Transport Co., Sandusky, O.
*Russell Rarey, Marble Cliff Quarries Co., Columbus, O. (Chairman of committee).
*R. G. Spencer, National Lime & Stone Co., Findlay, O.
Charles Raabe, Raabe Stone Co., Ft. Jennings, O.
Dick O'Neil, Southern Ohio Quarries Co., Chillicothe, O.
S. M. Wooley, S. M. Wooley Quarry, Marion, O.

Sand and Gravel:

(F. D. Coppock, American Aggregates Corp., Greenville, O.—Not a member of the Regional Committee, but a member of Code Authority.)
*Wm. Edward Hole, American Aggregates Corp., Greenville, O. (Vice-chairman of committee).
C. E. Glander, American Materials Corp., Greenville, O.
*Stephen Stepanian, Arrow Sand & Gravel Co., Columbus, O. (Treasurer of committee).
A. E. Frosch, Eastern Ohio Sand & Supply Co., East Liverpool, O.
Leonard C. Bull, Kinsman Sand & Gravel Co., Kinsman, O.
L. K. Warner, Marion Sand & Gravel Co., Marion, O.
*Earl Zimmerman, Ohio Gravel Co., Cincinnati, O.
F. C. Fuller, Portsmouth Sand & Gravel Co., Portsmouth, O.
Hal G. Knight, Rubber City Sand & Gravel Co., Akron, O.

Slag:

Kenneth Plum, American Steel & Wire Co. of New Jersey, Cleveland, O.
*E. L. Flad, Carnegie Steel Co., Frick Bldg., Pittsburgh, Pa.
W. H. Kilcawley, Cleveland Slag Co., Youngstown, O.
John Baird, National Tube Co., Lorain, O.
*W. E. Bliss, Standard Slag Co., Youngstown, O. (Member of Code Authority).
*Fred Hubbard, Standard Slag Co., Youngstown, O.
I. C. Stroth, Stroth Bros. Slag Co., Wellston, O.

Chairman Rarey, who presided at the meeting of the Executive Committee on Dec. 19, appointed the following standing committees:

ACCIDENT-PREVENTION COMMITTEE

E. L. Flad, Carnegie Steel Co., Pittsburgh, Pa. (Chairman of committee).
C. G. Knoblauch, National Lime & Stone Co., Findlay, O.
F. C. Fuller, Portsmouth Sand & Gravel Co., Portsmouth, O.

FINANCIAL COMMITTEE

Stephen Stepanian, Arrow Sand & Gravel Co., Youngstown, O.
H. M. Sharp, France Stone Co., Toledo, O. (Chairman of committee).
Fred Hubbard, Standard Slag Co., Youngstown, O.

COST-DETERMINATION COMMITTEE

K. K. Wideman, American Aggregates Corp., Greenville, O.
E. L. Flad, Carnegie Steel Co., Pittsburgh, Pa.

E. J. Kaufman, Marble Cliff Quarries Co., Columbus, O. (Chairman of committee).

OPEN-PRICE-POLICY COMMITTEE

Russell Rarey, Marble Cliff Quarries Co., Columbus, O. (Chairman of committee).
Hal Knight, Rubber City Sand & Gravel Co., Akron, O.
Fred Hubbard, Standard Slag Co., Youngstown, O.

UNIFORM-TRADE-PRACTICE COMMITTEE

Bert Herzog, Herzog Lime & Stone Co., Forest, O.
Earl Zimmerman, Ohio Gravel Co., Cincinnati, O. (Chairman of committee).
C. V. Wasser, Standard Slag Co., Youngstown, O.

CREDENTIALS COMMITTEE

Wm. Edward Hole, American Aggregates Corp., Greenville, O.
H. M. Sharp, France Stone Co., Toledo, O.
W. E. Bliss, Standard Slag Co., Youngstown, O.

Information regarding the state and district committees has not been received.

Region 9

One hundred and fifty-six producers of crushed stone, sand and gravel, and slag, representing about 80 per cent. of the known tonnage of the ninth region (Illinois and Indiana), registered for the regional meeting at the Palmer House, Chicago, Dec. 12 and 13, 1933. The average annual production of each group for the 5-yr. period, 1928 to 1932, follows:

	Illinois (*tons*)	Indiana (*tons*)	Total (*tons*)
Crushed stone...	5,400,000	2,400,000	7,800,000
Sand and gravel.	9,600,000	6,900,000	16,500,000
Slag			600,000
Total			24,900,000

The producers of Indiana building stone have their own code, while the Illinois silica- and molding-sand producers plan to establish a division under the aggregates code.

Under the temporary chairmanship of W. R. Sanborn the meeting elected the following:

REGIONAL COMMITTEE

(* Indicates member of Executive Committee)

Crushed Stone:

*E. J. Krause, Columbia Quarry Co., St. Louis, Mo. (Member of Code Authority).
*J. J. O'Laughlin, Consumers' Co., Chicago, Ill.
Fred C. Murphy, Electric Limestone Co., St. Louis, Mo.
G. F. Hammersmidt, Elmhurst-Chicago Crushed Stone Co., Elmhurst, Ill.
Edward F. Healy, France Limestone Co., Toledo, O.
*W. R. Sanborn, Lehigh Stone Co., Kankakee, Ill. (Chairman of committee).
L. R. Cartwright, Midwest Rock Products Co., Indianapolis, Ind.
Geo. A. Balfe, Monon Crushed Stone Co., Monon, Ind.
W. N. Carter, National Stone Co., Joliet, Ill.
*N. E. Kelb, Ohio & Indiana Stone Co., Indianapolis, Ind. (Vice-chairman of committee).
H. J. Dean, Ripley County Construction Co., Osgood, Ind.

Sand and Gravel:

C. Gray, American Aggregates Corp., Indianapolis, Ind.
Charles Rosenbarger, Brown-Rosenbarger Gravel Co., Indianapolis, Ind.
*George W. Renwick, Chicago Gravel Co., Chicago, Ill. (Treasurer of committee).
C. D. Casten, Clear Lake Sand & Gravel Co., Springfield, Ill.
W. J. Warner, Consumers' Co., Chicago, Ill.
Bert Koenig, Koch Sand & Gravel Co., Evansville, Ind.
*R. E. Weaver, Lincoln Sand & Gravel Co., Lincoln, Ill. (Secretary of committee).
*T. E. McGrath, McGrath Sand & Gravel Co., Lincoln, Ill.
E. Guy Sutton, Neal Gravel Co., Mattoon, Ill. (Member of Code Authority).
Bruce J. Harrington, Smith & Harrington, Marseilles, Ill.
*W. H. Sanders, Western Indiana Gravel Co., Lafayette, Ind. (Vice-chairman of committee).

Slag:

*N. D. Connelly, Chicago, Ill.
P. C. Connelly, Calumet City, Ill.
Fred Breidenbach, France Stone Co., Ft. Wayne, Ind.
H. M. Sharp, France Stone Co., Toledo, O.
J. A. Van Nuck, France Stone Co., Chicago, Ill.
I. Enzor, Illinois Slag & Ballast Co., Chicago, Ill.
*L. E. McDermut, Illinois Slag & Ballast Co., Chicago, Ill. (Vice-chairman of committee; member of Code Authority).
W. H. Reid, Illinois Slag & Ballast Co., Chicago, Ill.
(Three others to be elected as they qualify.)

The following state committees were elected:

ILLINOIS STATE COMMITTEE

Stationary Plants:

Otto Ellingen, H. D. Conkey Co., Mendota, Ill.
John Sankey, Joliet Gravel Co., Springfield, Ill.
W. R. Sanborn, Lehigh Stone Co., Kankakee, Ill.

Portable Plants:

E. L. Chesebro, Churchill Gravel Co., Pontiac, Ill.
F. M. Johnson, Dixon, Ill.
Arb. Sandusky, Marseilles, Ill.

Seventh Member:

W. H. Voskuil, mineral economist, State Geological Survey, Urbana, Ill.

INDIANA STATE COMMITTEE

Stationary Plants:

N. E. Kelb, Erie Stone Co., Indianapolis, Ind.
Robert E. O'Connor, J. C. O'Connor & Sons, Inc., Ft. Wayne, Ind.
L. F. Hart, Wabash Sand & Gravel Co., Terre Haute, Ind.

Portable Plants:

W. C. Babcock, W. C. Babcock Grain Co., Rensselaer, Ind.
Charles Rosenbarger, Brown-Rosenbarger Gravel Co., Indianapolis, Ind.
R. L. Squire, Jackson & Squire, Sanborn, Ind.

Seventh Member:

(To be elected.)

Other committees elected are the following:

REGIONAL CREDENTIALS COMMITTEE

R. E. Weaver, Lincoln Sand & Gravel Co., Lincoln, Ill. (Chairman of committee).
W. N. Carter, National Stone Co., Joliet, Ill.
W. H. Sanders, Western Indiana Gravel Co., Lafayette, Ind.

COMMITTEE ON COMPETITION OF GOVERNMENTAL UNITS AND PRISON LABOR

H. M. Sharp, France Stone Co., Toledo, O. (Chairman of committee).
L. E. McDermut, Illinois Slag & Ballast Co., Chicago, Ill.
N. E. Kelb, Ohio & Indiana Stone Co., Indianapolis, Ind.

Chairman W. R. Sanborn was directed to appoint district committees, which he named as follows:

DISTRICT COMMITTEES

District 1

(Those parts of Illinois and Indiana included within the boundaries of the Chicago Switching District.)

Crushed Stone:

J. J. O'Laughlin, Consumers Co., Chicago, Ill.
W. R. Sanborn, Lehigh Stone Co., Kankakee, Ill. (Chairman of committee).
W. N. Carter, National Stone Co., Joliet, Ill.

Sand and Gravel:

O. J. Ellingen, H. D. Conkey Co., Mendota, Ill.
Henry Crown, Material Service Corp., Chicago, Ill.
Frank Land, Merom Gravel Co., Merom, Ind.
George H. Hartong, Morton Sand & Gravel Co., Chicago, Ill.
Charles H. Purdum, Sturm & Dillard, Syracuse, Ind.

District 2

(Those parts of Illinois and Indiana outside the Chicago Switching District; west of the Chicago, Indianapolis & Louisville Ry. from the South Hammond yard to Mitchell, Ind.; and north of the Baltimore & Ohio R. R. connecting East St. Louis, Ill., and Mitchell, Ind.)

Crushed Stone:

E. J. Krause, Columbia Quarry Co., St. Louis, Mo.
W. R. Sanborn, Lehigh Stone Co., Kankakee, Ill.
L. R. Cartwright, Midwest Rock Products Co., Indianapolis, Ind.
A. H. Bannister, Moulding-Brownell Corp., Chicago, Ill.
W. N. Carter, National Stone Co., Joliet, Ill.

Sand and Gravel:

George W. Renwick, Chicago Gravel Co., Chicago, Ill.
John Sankey, Joliet Gravel Co., Springfield, Ill.
T. E. McGrath, McGrath Sand & Gravel Co., Lincoln, Ill.
E. Guy Sutton, Neal Gravel Co., Mattoon, Ill. (Chairman of committee).
Bruce J. Harrington, Smith & Harrington, Marseilles, Ill.
Charles F. Connelly, Terre Haute Gravel Co., Terre Haute, Ind.

District 3

(Those parts of Illinois and Indiana south of the Baltimore & Ohio R. R. connecting St. Louis, Mo., and Cincinnati, O.)

Crushed Stone:

O. O. Karracker, Anna Stone Co., Anna, Ill.
E. J. Krause, Columbia Quarry Co., St. Louis, Mo.
N. E. Kelb, Ohio & Indiana Stone Co., Indianapolis, Ind. (Chairman of committee).
H. J. Dean, Ripley County Construction Co., Osgood, Ind.

Sand and Gravel:

E. C. Theobald, Anderson-Theobald Co., Vincennes, Ind.
J. M. Bedford, Bedford-Nugent Co., Evansville, Ind.
Norman R. Halliday, H. H. Halliday Sand Co., Cairo, Ill.
R. L. Squire, Jackson & Squire, Sandborn, Ind.
Bert Koenig, Koch Sand & Gravel Co., Evansville, Ind.

District 4

(That part of Indiana outside the Chicago Switching District; east of the Chicago, Indianapolis & Louisville Ry. from the South Hammond Yard to Mitchell, Ind.; and north of the Baltimore & Ohio R. R. connecting Mitchell, Ind., and Cincinnati, O.)

Crushed Stone:

I. J. O'Laughlin, Consumers' Co., Chicago, Ill.
Edward F. Healy, France Limestone Co., Toledo, O.
L. R. Cartwright, Midwest Rock Products Co., Indianapolis, Ind.
George H. Balfe, Monon Crushed Stone Co., Monon, Ind.
W. N. Carter, National Stone Co., Joliet, Ill.
N. E. Kelb, Ohio & Indiana Stone Co., Indianapolis, Ind.

Sand and Gravel:

C. Gray, American Aggregates Corp., Indianapolis, Ind.
Charles Rosenbarger, Brown-Rosenbarger Gravel Co., Indianapolis, Ind.
George W. Renwick, Chicago Gravel Co., Chicago, Ill.
Robert E. O'Connor, J. C. O'Connor & Sons, Inc., Ft. Wayne, Ind.
W. H. Sanders, Western Indiana Gravel Co., Lafayette, Ind. (Chairman of committee).

Slag:

L. E. McDermut, Illinois Slag & Ballast Co., Chicago, Ill.

Region 10

At the regional meeting for aggregates producers in the tenth region (Michigan and Wisconsin), held at the Palmer House, Chicago, Dec. 14, 1933, 164 producers were represented, 98 by proxies and 56 in person. They were distributed as follows:

	Stationary Plants	Portable Plants	Total
Crushed Stone	22	9	31
Sand and Gravel.....	81	51	132
Slag	1	..	1
Total	104	60	164

Those entitled to vote by reason of their having registered elected the following:

REGIONAL COMMITTEE

Crushed Stone:

Otto A. Cheska, Consumers' Co., Racine, Wis.
M. R. Ward, France Stone Co., Detroit, Mich.
A. J. Cayia, Inland Lime & Stone Co., Manistique, Mich.
Edward Kraemer, Plain, Wis.
A. J. Blair, Lake Shore Sand & Stone Co., Milwaukee, Wis. (Vice-chairman of committee; member of Code Authority).
Ben H. Lampert, Lampert & Lampert, Oshkosh, Wis.
Richard W. Lutz, Lutz Stone Co., Oshkosh, Wis.
R. B. Henley, Michigan Limestone & Chemical Co., Rogers City, Mich.
R. S. Bain, Sturgeon Bay Co., Cleveland, O. (Plant at Sturgeon Bay, Wis.) (Representative at large).
C. R. Peregrine, Thunder Bay Quarries Co., Alpena, Mich.
R. N. Wallace, Wallace Stone Co., Bayport, Mich.

Sand and Gravel:

M. G. Kerr, American Aggregates Corp., Detroit, Mich. (Chairman of committee).
Frank M. Anderson, Anderson Gravel Co., Saginaw, Mich.
John F. Bloomer, Appleton, Wis.
J. V. Donahue, Brown-Rosenbarger Gravel Co., Ann Arbor, Mich.
Smith Taylor, Construction Materials Corp., Grand Haven, Mich.
H. N. Battjes, Grand Rapids Gravel Co., Grand Rapids, Mich. (Member of Code Authority).
J. K. Jenson, Janesville Sand & Gravel Co., Janesville, Wis.
Otto Lutz, Ed. Lutz Sand & Gravel Co., Milwaukee, Wis.
Ezra Sensibar, Michigan Gravel Co., Chicago, Ill. (Plants at Emerson, Greenbush, Roscommon and Stimson, Mich.).
William Rasmussen, J. Rasmussen & Sons Co., Oshkosh, Wis.
George G. Brew, Waukesha Washed Sand & Gravel Co. and Madison Washed Sand & Gravel Co., Milwaukee, Wis. (Representative at large).

Slag:

H. Fenske (address unknown).
K. A. Dietrich, Great Lakes Steel Corp., Detroit, Mich. (Secretary-treasurer of committee; member of Code Authority).
W. W. Lavers, Great Lakes Steel Corp., Detroit, Mich.
(No other nominees available).

The meeting then elected the following state committees:

MICHIGAN STATE COMMITTEE

Stationary Plants:

M. G. Kerr, American Aggregates Corp., Detroit, Mich.
H. N. Battjes, Grand Rapids Gravel Co., Grand Rapids, Mich.
L. Dyament, Ward Sand & Gravel Co., Oxford, Mich.

Portable Plants:

J. V. Donahue, Brown-Rosenbarger Gravel Co., Ann Arbor, Mich.
M. Peterson, Peterson Sand & Gravel Co., Harrisville, Mich.
B. Plaggomars, West Michigan Construction Co., Holland, Mich.

WISCONSIN STATE COMMITTEE

Seventh Member:

(To be elected).

Stationary Plants:

A. O. Ayres, Eau Claire Sand & Gravel Co., Eau Claire, Wis.
R. W. Lutz, Lutz Stone Co., Oshkosh, Wis.
Frank A. Bingham, Northern Gravel Co., West Bend, Wis.

Portable Plants:

Ben H. Lampert, Lampert & Lampert, Oshkosh, Wis.
F. F. Memgel, Wisconsin Rapids, Wis.
Myron Woodruff, Stark & Woodruff, Waterloo, Wis.

Seventh Member:

(To be elected).

The region was divided into the following districts for each of which a temporary committee was to have been called together by the man named:

MICHIGAN DISTRICTS

District 1

(Macomb, Oakland, St. Clair and Wayne Counties).
M. G. Kerr (convener), American Aggregates Corp., Detroit, Mich.

District 2

(Brand, Calhoun, Eaton, Hillsdale, Ingham, Jackson, Lenawee, Livingston, Monroe and Mashtenaw Counties).
W. F. Fisher (convener), Tecumseh Gravel Co., Tecumseh, Mich.

District 3

(Allegan, Barry, Berrien, Cass, Ionia, Kalamazoo, Kent, Lake, Mason, Mecosta, Montcalm, Newago, Oceana, Osceola, Ottawa, St. Joseph and Van Buren Counties).
Harley North (convener), American Aggregates Corp., Detroit, Mich.

District 4

(Arenac, Bay, Clare, Clinton, Genessee, Gladwin, Gratiot, Huron, Isabella, Lapeer, Midland, Saginaw, Sanilac, Shiawassee and Tuscola Counties).
F. M. Anderson (convener), Anderson Sand & Gravel Co., Saginaw, Mich.

District 5

(Alcona, Alpena, Antrim, Benzie, Charlevoix, Cheboygan, Crawford, Emmet, Grand Traverse, Iosca, Kalkaska, Leelanau, Manistee, Missaukee, Montmorency, Ogemaw, Oscoda, Otsego, Presque Isle, Roscommon and Wexford Counties).
H. H. Lucas (convener), Petoskey Portland Cement Co., Petoskey, Mich.
(All the counties of the Upper Peninsula of Michigan).
A. J. Cayia (convener), Inland Lime & Stone Co., Manistique, Mich.

WISCONSIN DISTRICTS

District 1

(Milwaukee County).
A. J. Blair (convener), Lake Shore Sand & Stone Co., Milwaukee, Wis.

District 2

(Dodge, Jefferson, Kenosha, Ozaukee, Racine, Rock, Walworth, Washington and Waukesha Counties).
Otto Cheska (convener), Consumers' Co., Racine, Wis.

District 3

(Brown, Calumet, Door, Florence, Fond du Lac, Forest, Kewaunee, Langlade, Manitowoc, Marinette, Oconto, Outagamo, Shawano, Sheboygan, Waupaca and Winnebago Counties).
R. W. Lutz (convener), Lutz Stone Co., Oshkosh, Wis.

District 4

(Adams, Columbia, Crawford, Dane, Green Lake, Grant, Green, Iowa, Juneau, LaCrosse, Lafayette, Marquette, Monroe, Richland, Sauk, Vernon and Waushara Counties).
George Brew (convener), Waukesha Washed Sand & Gravel Co., Milwaukee, Wis.

District 5

(Ashland, Barron, Bayfield, Buffalo, Burnett, Chippewa, Clark, Douglas, Dunn, Eau Claire, Iron, Jackson, Lincoln, Marathon, Oneida, Pepin, Pierce, Polk, Portage, Price, Rusk, St. Croix, Sawyer, Taylor, Trempeleau, Vilas, Washburn and Wood Counties).
O. A. Ayres (convener), Eau Claire Sand & Gravel Co., Eau Claire, Wis.

The permanent regional office will be located at Detroit, Mich., and the "assistant" regional office at Milwaukee, Wis.

Region 11

An indicated average annual production of approximately 9,000,000 tons was registered for the Dec. 7 meeting of the eleventh region (Minnesota, North Dakota and South Dakota) held at the Minneapolis Club, St. Paul. More than 500 producers had been notified of the meeting, but only 83 were represented either in person or by proxy. J. L. Shiely was chairman of the meeting and W. W. Gibson, secretary.

To give representation to the operators of portable plants it was decided to enlarge the proposed Regional Committee to 14 members. The meeting then elected the following to serve on the

REGIONAL COMMITTEE

Crushed Stone:

S. E. Berg, Minneapolis, Minn.
H. C. Boyd, Allen P. Boyd Co., Altura, Minn.
E. D. J. Coughlan, T. R. Coughlan Co., Mankato, Minn.

William A. Armstrong, Dell Rapids Quarry Co., Chicago, Ill. (Plant at Dell Rapids, S. Dak.)
C. D. Brewer, Duluth Crushed Stone Co., Duluth, Minn.
Joseph Halley, Minn.
C. A. Wagner, C. A. Wagner Construction Co., Sioux Falls, S. Dak. (Member of Code Authority.)

Sand and Gravel:

M. D. Butler, Butler Construction Co., Grand Forks, N. Dak.
W. C. Cohoe, E. W. Coons Co., Hibbing, Minn.
E. W. Hallett, Hallett Construction Co., Crosby, Minn.
J. R. McKenzie, Minn. (Secretary of Committee).
S. J. Reader, Minneapolis, Minn. (Member of Code Authority.)
J. L. Shiely, J. L. Shiely Co., St. Paul, Minn.
L. E. Luth, Winona Sand & Gravel Co., Winona, Minn.

The producers then assembled by states and elected the following State Committees:

MINNESOTA STATE COMMITTEE

Stationary Plants:

E. W. Hallett Construction Co., Crosby, Minn.
A. R. Shiely, J. L. Shiely Co., St. Paul, Minn.
C. H. Young, Charles H. Young Co., Minneapolis, Minn.

Portable Plants:

E. H. Maag, Cosmos Construction Co., Cosmos, Minn.
C. L. Butler, Hector Construction Co., Hector, Minn.
S. J. Reader, Minneapolis, Minn.

Seventh Member:

(To be elected.)

NORTH DAKOTA STATE COMMITTEE

Stationary Plants:

C. E. Wood, Minot Gravel Co., Minot, N. Dak.
J. H. Newton, Riverside Gravel Co., Mandan, N. Dak.
A. R. Shiely, J. L. Shiely Co., St. Paul, Minn.

Portable Plants:

M. D. Butler, Butler Construction Co., Grand Forks, N. Dak.
Art Miller, Fargo, N. Dak.
Marie Nerling, Wilder & Wilder, Jamestown, N. Dak.

Seventh Member:

W. G. Connors, Minot, N. Dak.

SOUTH DAKOTA STATE COMMITTEE

Stationary Plants:

Delbert Wheeler, Consolidated Sand & Stone Co., Sioux Falls, S. Dak.
S. W. Jonason, Aberdeen, S. Dak.
C. A. Wagner, C. A. Wagner Construction Co., Sioux Falls, S. Dak.

Portable Plants:

S. J. Erling, Sioux Falls, S. Dak.
Herman Pickus, H. Pickus Construction Co., Aberdeen, S. Dak.
John Toshey, Sioux Falls, S. Dak.

Seventh Member:

Herbert Everist, L. G. Everist, Inc., Sioux City, Ia.

At a meeting held on Dec. 19 the operators of stationary plants in Minnesota decided upon the following districts as marketing areas:

District 1

(Southeastern Minnesota)

Beginning at LeRoy on G. W. & Mil. R. R., north to Grand Meadow on the Milwaukee R. R., northwest to Dodge Center on the N. W. R. R., northeast to Mantorville on N. W. R. R., north to Wanamingo on the Milwaukee R. R., northeast to Hay Creek on the C. G. W. R. R., northeast to Wacouta on the Milwaukee R. R.

District 2

(Southern Minnesota)

Beginning at LeRoy on the Milwaukee R. R., north to Grand Meadow on the Milwaukee R. R., northwest to Dodge Center on the N. W. R. R., northwest to Faribault on the C. G. W. R. R., north to Webster on the Milwaukee R. R., southwest to Montgomery on the Milwaukee R. R., northwest to Belle Plaine on the Omaha R. R., southwest to Klossner on the M. & St. L. R. R., northwest to Morton on the M. & St. L. R. R., west to Redwood Falls on the N. W. R. R., west to Vesta on the N. W. R. R., west to Marshall Junction on the N. W. R. R., south to Balaton on the N. W. R. R., southwest to Pipestone on the Omaha R. R., north to Tyler on the N. W. R. R., north to Ghent on the N. W. R. R. following N. W. R. R. to the Dakota state line.

District 3

(Twin City Area)

Beginning between Pine City and Beroun on the N. P. R. R., west to Hillman on the Soo Line, south to Oak Park on the G. N. R. R., southwest to Clear Lake and Clear Water on the N. P. and G. N. R. R., west to Watkins on the Soo, southeast to Dassel on the G. N. R. R., southwest to Olivia on the Milwaukee R. R., south to Morton on the M. & St. L. R. R., northeast to Belle Plaine on the Omaha R. R., southeast to Montgomery on the M. & St. L., northeast to Webster on the Milwaukee R. R., southeast to Faribault on the C. G. W. R. R., southeast to Dodge Center on the C. G. W. R. R., north to Mantorville on the N. W. R. R., north to Wanamingo on the Milwaukee R. R., northeast to Hay Creek on the C. G. W. R. R., northeast to Wacouta on the Milwaukee R. R.

District 4

(Northeastern Minnesota)

Beginning at International Falls, south to Ballclub on the G. N. R. R., south to Remer on the Soo Line, south to Aitken on the N. P. R. R., south to Hillman on the Soo Line, east to a point between Pine City and Beroun on the N. P. R. R.

District 5

(Northwestern and Central Western Minnesota)

Beginning at International Falls, thence southwest to Ballclub, thence south through Remer, Aitkin, Hillman and Oak Park, thence southwest to, Clear Lake, southwest to Watkins, southeast to Dassel, southwest to Olivia, south to Morton, thence southwest through Redwood Falls, Vesta and Marshall Junction, thence southwest to Balaton, southwest to Pipestone, north to Tyler, northeast to Ghent on the C. & N. W. R. R., thence following C. N. W. R. R. to Dakota State Line, thence following Dakota State Line North to Canadian Boundary, thence following Canadian boundary east to beginning at International Falls.

At this Dec. 19 meeting action was taken toward the formation of a separate division for so-called road-surfacing contractors.

Region 12

At the Paxton Hotel, Omaha, Neb., on Nov. 27, 1933, producers of aggregates in the twelfth region (Iowa and Nebraska) assembled to perfect their regional organization. Of the 115 producers registered, 66 were from Iowa and 38 from Nebraska.

Those in attendance elected the following:

REGIONAL COMMITTEE

Crushed Stone:

S. P. Moore, Builders' Material Co., Cedar Rapids, Ia.
R. C. Fletcher, Flint Crushed Gravel Co., Des Moines, Ia. (Member of Code Authority).
E. A. Howard, LeGrand Limestone Co., 105 W. Monroe St., Chicago, Ill. (Plants at Lake View, LeGrand and Peterson, Ia.).
J. A. Rockwell, National Stone Co., Omaha, Neb.
M. O. Weaver, M. O. Weaver Co., Iowa Falls, Ia.
H. E. Schellberg, Western Limestone Products Co., Omaha, Neb.
G. D. Poarch, Winterset Limestone Co., Winterset, Ia.

Sand and Gravel:

(Fred P. Curtis, Lyman-Richey Sand & Gravel Co., Omaha, Neb.—Not a member of the Regional Committee, but a member of Code Authority.)
Gaylord E. Gray, Central Iowa Sand & Gravel Co., Des Moines, Ia. (Secretary-treasurer of committee).
C. E. Thomas, Ideal Sand & Gravel Co., Mason City, Ia.
W. T. Kelly, Des Moines, Ia.
J. A. Knapp, Lincoln, Neb.
E. W. Boynton, Northern Gravel Co., Muscatine, Ia.
W. M. Stoner, Reiners-Kaufman Co., Lincoln, Neb. (Chairman of committee).
George D. Schellberg, Schellberg Sand & Gravel Co., Omaha, Neb.

IOWA STATE COMMITTEE

Stationary Plants:

H. D. Bellamy, Concrete Materials Corp., Waterloo, Ia. (Secretary of committee).
Paul M. Nauman, Dubuque Stone Products Co., Dubuque, Ia.
Grant McGown, Ideal Sand & Gravel Co., Mason City, Ia.

Portable Plants:

E. L. Kaser, Kaser Construction Co., Adel, Ia.
H. R. Maudlin, Nevada, Ia.
M. O. Weaver, M. O. Weaver Co., Iowa Falls, Ia.

Seventh Member:

Charles M. Young, Waterloo, Ia. (Chairman of committee).

NEBRASKA STATE COMMITTEE

Stationary Plants:

J. H. Johnson, Lincoln Neb.
L. C. Curtis, Lyman-Richey Sand & Gravel Co., Omaha, Neb. (Chairman of committee).
H. E. Schellberg, Western Limestone Products Co., Omaha, Neb.

Portable Plants:

L. P. Carstenson, Carstenson Sand Co., Columbus, Neb.
E. W. Nichols, E. W. Nichols Construction Co., Fairmont, Neb.
L. A. Blair, Yant Construction Co., Omaha, Neb.

Seventh Member:

S. P. Lindley, Adel Construction Co., Lincoln, Neb. (Secretary of committee).

The following five districts have been proposed for Iowa:

District A:

That part of Iowa west of the eastern boundaries of Emmet, Palo Alto, Pocahontas, Calhoun, Greene and Audobon Counties; north of the south boundaries of Greene, Audobon, Shelby and Monona Counties; and east of the western boundary of Shelby County.

District B:

That part of Iowa bounded on the west by District A; on the south by the northern boundaries of Dallas, Polk, Jasper, Mahaska and Keokuk Counties; and on the east by the western boundaries of

Winneshiek, Fayette, Buchanan, Beubon and Iowa Counties.

District C:

That part of Iowa bounded on the west by the eastern boundary of District B and the eastern boundaries of Keokuk, Jefferson and Van Buren Counties.

District D:

That part of Iowa south of District A and west of the western boundaries of Cass, Adams and Taylor Counties.

District E:

The remainder of the state.

The districting committee for Nebraska has not yet filed its report.

Region 13

On Nov. 21, 1933, the producers of Kansas, Missouri and Oklahoma, which comprise the thirteenth region, met to set up their regional organization. About 110 producers registered at the meeting and about 40 more have registered since that time. The committees already elected include the following:

REGIONAL COMMITTEE

(* Indicates member of Executive Committee).

Crushed Stone:

Henry Dolese, Dolese Bros., Oklahoma City, Okla.
*R. N. McDowell, Blackwater Stone Co., Kansas City, Mo.
*M. Moss Alexander, Missouri Portland Cement Co., St. Louis, Mo.
H. E. Billman, Rock Hill Quarries Co., St. Louis, Mo.
W. F. Wise, Southwest Stone Co., Dallas, Tex.
*John Prince, Stewart Sand & Material Co., Kansas City, Mo. (Chairman of committee; member of Code Authority).

Sand and Gravel:

N. C. Dunn, Arkansas City Sand & Gravel Co., Arkansas City, Kan.
*M. W. Watson, Consumers Sand Co., Topeka, Kan. (Secretary-treasurer of committee).
Ben Reynolds, Independent Gravel Co., Joplin, Mo.
H. E. Moore, Jr., Missouri River Sand & Gravel Co., Boonville, Mo.
*J. M. Chandler, Price Sand Co., Tulsa, Okla.
O. W. Knight, River Sand Co., Topeka, Kan.
Stuart Simpson, San-Ore Construction Co., Inc., McPherson, Kan.
G. E. Williamson, Tulsa Sand Co., Tulsa, Okla.
*H. E. West, West Sand Co., Muskogee, Okla. (Vice-chairman of committee; member of Code Authority).
C. M. Hise, Welch-Sandler Sand & Gravel Co., Kansas City, Mo. (Assistant secretary-treasurer of committee).
W. S. Dills, Yahola Sand & Gravel Co., Muskogee, Okla.

Miscellaneous (industry not reported; probably crushed stone):

E. E. Davis, Poplar Bluff, Mo.
S. E. Fones, Pittsburg, Kan.
D. G. Hansen, Logan, Kan.
A. F. Reis, Ft. Scott, Kan.
Roy Tanner, Tulsa, Okla.
W. R. Tuley, Valley Park, Mo.

MISSOURI STATE COMMITTEE

Stationary Plants:

C. G. Cooley, Gravel Co., Chillicothe, Mo.
M. Moss Alexander, Missouri Portland Cement Co., St. Louis, Mo.
John Prince, Stewart Sand & Material Co., Kansas City, Mo.

Portable Plants:

G. G. Hill, Dexter, Mo.
J. A. Kerr, Ozark, Mo.
C. E. Rich, Troy, Mo.

Seventh Member:

E. J. McGrew, Lexington, Mo.

MISSOURI DISTRICT COMMITTEES

District 1:

E. L. Schneider, Centropolis Crusher Co., Kansas City, Mo.
C. G. Cooley, Cooley Gravel Co., Chillicothe, Mo.
Henry Hesse, St. Joseph, Mo.
Frank Peck, Peck-Woolf Sand & Material Co., Kansas City, Mo.
R. J. Stewart, Pioneer Sand Co., St. Joseph, Mo.
John Prince, Stewart Sand & Material Co., Kansas City, Mo.

District 2:

Walter Skrainka, Big Bend Quarry Co., St. Louis, Mo.
W. J. Eyermann, Eyermann Contracting Co., St. Louis, Mo.
M. Hendy, St. Louis, Mo.
M. Moss Alexander, Missouri Portland Cement Co., St. Louis, Mo.
H. E. Billman, Rock Hill Quarries Co., St. Louis, Mo.
John Ruprecht, Ruprecht Building Material Co., St. Louis, Mo.
Otto S. Conrades, St. Louis Material & Supply Co., St. Louis, Mo.

District 5:

L. Diemund, Arnold Stone Co., Cape Girardeau, Mo.
A. H. Boller, Bell City, Mo.
Mr. Dillman, Dillman Industries, Inc., Caruthersville, Mo.
A. L. Zimmer, Federial Materials Co., Cape Girardeau, Mo.
A. W. Harrison, Lutesville Sand & Gravel Co., Cape Girardeau, Mo.
H. O. Cole, Marquette Cement Mfg. Co., Cape Girardeau, Mo.

OKLAHOMA DISTRICT COMMITTEE

W. E. Rogers, Arkansas River Sand Co., Tulsa, Okla.
Henry Dolese, Dolese Bros., Oklahoma City, Okla.
C. H. Makins, Makins Sand & Gravel Co., Oklahoma City, Okla.
W. F. Wise, Southwest Stone Co., Dallas, Tex.
W. S. Dills, Yahola Sand & Gravel Co., Muskogee, Okla.

Region 14

In a 2-day meeting of the Temporary Regional Committee of Region 14 and producers from Arizona, Colorado, New Mexico, Utah and Wyoming, held at the Cosmopolitan Hotel, Denver, Colo., Dec. 11 and 12, the following regional organization was decided upon.

REGIONAL COMMITTEE

Crushed Stone:

E. W. Everly, Everly & Allison, Albuquerque, N. M.
G. W. Hamilton, Hamilton & Gleason Co., Denver, Colo. (Secretary of committee).
Alfred Paul, Paul Lime Plant, Paul Spur, Ariz.
J. F. Underwood, United Gold Mines, Colorado Springs, Colo.
H. B. Way, Utah Sand & Gravel Products Corp., Salt Lake City, Utah.
Eric Ryberg, Utah Sand & Gravel Products Corp., Salt Lake City, Utah.
M. W. Woodward, Woodward Construction Co., Rock Springs, Wyo. (Member of Code Authority).

Sand and Gravel:

D. W. Kelley, Arizona Sand & Rock Co., Phoenix, Ariz.
F. P. Spratlen, Jr., J. W. Brannan Sand & Gravel Co., Denver, Colo. (Chairman of committee; member of Code Authority).
W. W. Clyde, W. W. Clyde & Co., Springville, Utah.
R. E. Bristol, Ideal Sand Co., Ogden, Utah.
A. H. Read, A. H. Read Co., Cheyenne, Wyo.
L. C. Bennet, Springer Transfer Co., Albuquerque, N. M.
J. E. Whisenand, Green River Sand & Gravel Plants, Rock Springs, Wyo.

Slag:

Arthur L. Allen, Arthur & Allen, Pueblo, Colo. (Member of Code Authority).
Fields Arthur, Arthur & Allen, Pueblo, Colo.
Louis Behm, Arthur & Allen, Pueblo, Colo.
Vance J. Driscoll, Driscoll Construction Co., Pueblo, Colo.
R. H. Seaman, Driscoll Construction Co., Pueblo, Colo.
W. S. Broderick, Western Paving & Construction Co., Denver, Colo.
G. E. Ralston, Western Paving & Construction Co., Denver, Colo.

ARIZONA STATE COMMITTEE

Stationary Plants:

D. W. Kelley, Arizona Sand & Rock Co., Phoenix, Ariz.
Edward Van Doorn, Phoenix Tempe Stone Co., Phoenix, Ariz.
W. T. Bartol, Union Rock Co., Phoenix, Ariz.

Portable Plants:

Ken Hodgman, San Marino, Calif.
M. H. Hasler, Pleasant-Hasler Construction Co., Phoenix, Ariz.
Vic Griffith, Tucson Rock & Sand Co., Tucson, Ariz.

Seventh Member:

(To be elected).

COLORADO STATE COMMITTEE

Stationary Plants:

Lloyd S. Brannan, J. W. Brannan Sand & Gravel Co., Denver, Colo.
Joe A. Bullen, Fountain Sand & Gravel Co., Pueblo, Colo.
David A. Olson, Denver, Colo.

Portable Plants:

Vance J. Driscoll, Driscoll Construction Co., Pueblo, Colo.
G. W. Hamilton, Hamilton & Gleason Co., Denver, Colo.
J. H. Monaghan, J. H. & M. N. Monaghan, Denver, Colo.

Seventh Member:

(To be elected).

NEW MEXICO STATE COMMITTEE

Stationary Plants:

F. D. Shufflebarger, Shufflebarger Transfer & Storage Co., Albuquerque, N. M.
L. C. Bennet, Springer Transfer Co., Albuquerque, N. M.
J. K. Walton, Springer Transfer Co., Albuquerque, N. M.

Portable Plants:

L. R. Allison, Everly & Allison, Albuquerque, N. M.
Ernest W. Everly, Everly & Allison, Albuquerque, N. M.
A. R. Hebenstreet, New Mexico Construction Co., Albuquerque, N. M.

Seventh Member:

(To be elected).

UTAH STATE COMMITTEE

Stationary Plants:

Ralph E. Bristol, Ideal Sand Co., Ogden, Utah.
F. N. Maher, Salt Lake Valley Sand & Gravel Co., Salt Lake City, Utah.
Eric Ryberg, Utah Sand & Gravel Products Co., Salt Lake City, Utah.

Portable Plants:

W. W. Clyde, W. W. Clyde & Co., Springville, Utah.
Olaf Nelson, Logan, Utah.

H. B. Way, Utah Construction Co., Ogden, Utah.

Seventh Member:

(To be elected).

WYOMING STATE COMMITTEE

Stationary Plants:

James Jennetti, Green River Sand & Gravel Plants, Rock Springs, Wyo.

Hilda Whisenand, Green River Sand & Gravel Plants, Rock Springs, Wyo.

John E. Whisenand, Green River Sand & Gravel Plants, Rock Springs, Wyo.

Portable Plants:

A. H. Read, A. H. Read Co., Cheyenne, Wyo.

C. W. Taggart, Taggart Construction Co., Cody, Wyo.

M. W. Woodward, Woodward Construction Co., Rock Springs, Wyo.

Seventh Member:

(To be elected).

Region 15

California and Nevada producers of crushed stone and sand and gravel met for a 2-day session at the Californian, Fresno, Cal., on Dec. 4 and 5, 1933. Eighty-three producers, representing 90 per cent. of the total aggregates production of the region, registered either in person or by proxies.

REGIONAL COMMITTEE

(Information regarding the industries from which the following members were chosen is not sufficient to warrant classification by product).

M. F. Joyce, Arrow Rock Co., Los Angeles, Cal.

Anson S. Blake, Blake Brothers Co., San Francisco, Cal. (Chairman of committee; member of Code Authority).

F. W. Erlin, California Rock & Gravel Co., Los Angeles, Cal.

V. R. Dennis, Canyon Rock Co., San Diego, Cal.

F. J. Twaits, Consolidated Rock Products Co., Los Angeles, Cal. (Member of Code Authority).

P. C. Graham, Graham Brothers, Inc., Long Beach, Cal. (Secretary of committee).

A. J. Wilson, Granite Rock Co., Watsonville, Cal.

Charles M. Cadman, Pacific Coast Aggregates, Inc., San Francisco, Cal. (Assistant secretary of committee).

P. W. Schoeningh, Perkins Gravel Co., Sacramento, Cal.

J. B. Robinson, Rhodes & Robinson, Palo Alto, Cal.

H. W. Rohl, R. W. Rohl & J. E. Connolly, Los Angeles, Cal.

A. H Stovall, Santa Clara Sand & Gravel Co., Ventura, Cal.

Neal Baker, Triangle Rock Co., San Bernardino, Cal.

R. E. Tremoureux, United States Lime Products Corp., Las Vegas, Nev.

CALIFORNIA STATE COMMITTEE

(Information regarding the following members is not sufficient to warrant classification by type of plant).

Producers:

R. L. Robinson, Atlas Olympia Co., Oakdale, Cal.

Carl Wittenberg, Consolidated Rock Products Co., Los Angeles, Cal. (Chairman of committee).

F. H. Gates, F. H. Gates, Inc., Santa Maria, Cal. (Secretary-treasurer of committee).

J. E. Porter, Granite Rock Co., Watsonville, Cal.

F. B. Marks, Newman, Cal.

H. W. Rohl, H. W. Rohl & J. E. Connolly, Los Angeles, Cal.

Seventh Member:

G. T. McCoy, Asst. State Highway Eng., State of California.

CALIFORNIA DISTRICT COMMITTEES

District 1

(No report on boundaries available).

Jack Smart, Consolidated Rock Products Co., Los Angeles, Cal. (Treasurer of committee).

C. H. Wittenberg, Consolidated Rock Products Co., Los Angeles, Cal.

C. D. Woolsey, El Rio Rock Co., Ventura, Cal.

F. H. Gates, F. H. Gates, Inc., Santa Maria, Cal.

H. H. Hiestand, Piru Rock Co., Ltd., Los Angeles, Cal.

G. B. Sewell, San Marcos Rock Co., Santa Barbara, Cal.

O. P. Barker, Santa Clara Sand & Gravel Co., Ventura, Cal. (Chairman of committee).

A. N. Vela, Santa Paula Rock Co., Santa Paula, Cal. (Vice-chairman of committee).

H. H. Stovall, Saticoy Rock Co., Ventura, Cal. (Secretary of committee).

District 2

(Los Angeles and Orange Counties).

M. F. Joyce, Arrow Rock Co., Los Angeles, Cal.

C. A. Banks, Blue Diamond Corp., Ltd., Los Angeles, Cal. (Secretary of committee).

Wm. Ball, Burbank Rock Products Co., Hollywood, Cal.

Carl Wittenberg, Consolidated Rock Products Co., Los Angeles, Cal.

A. S. Lutes, Eaton Canyon Rock Co., Pasadena, Cal.

H. F. G. Pelsue, Graham Bros., Inc., Los Angeles, Cal. (Chairman of committee).

Claire Newberry, Granite Materials Co., Hollywood, Cal.

D. L. Holliday, Los Angeles County Rock Co., Baldwin Park, Cal.

H. H. Hiestand, Piru Rock Co., Ltd., Los Angeles, Cal.

L. E. Harbach, Jr., Security Materials Co., Los Angeles, Cal.

District 3

George Herz, George Herz & Co., San Bernardino, Cal.

E. Williamson, Mutual Rock Co., Riverside, Cal. (Secretary of committee).

E. D. Frans, Palm Springs Builders' Supply Co., Palm Springs, Cal.

E. G. Pinney, Pinney Sand & Rock Service, Redlands, Cal.

J. H. Briscoe, San Antonio Rock Co., Claremont, Cal.

F. A. Braman, Service Gravel Co., Riverside, Cal. (Chairman of committee).

N. O. Baker, Triangle Rock Co, San Bernardino, Cal.

District 4

G. D. Getty, Calaveras Rock Co., Oceanside, Cal. (Chairman of committee).

V. R. Dennis, Canyon Rock Co., San Diego, Cal. (Secretary of committee).

H. F. G. Pelsue, Graham Bros., Inc., Los Angeles, Cal.

Rodney Herman, H. G. Fenton Materials Co., San Diego, Cal.

J. E. Connolly, H. W. Rohl & J. E. Connolly, Los Angeles, Cal.

Paul R. Sloan, Nelson & Sloan, Chula Vista, Cal.

Region 16

The Regional Committee on Organization for the sixteenth region (Idaho, Montana, Oregon and Washington), under the chairmanship of Porter W. Yett, met at the Portland, Ore., office of the committee on Dec. 4, 1933.

On account of the immense area included in the region—it is about 1,000 mi. long from east to west and 710 mi. wide from north to south—it was decided to complete the organization in each state first and then call a regional meeting, some time before Jan. 20, to perfect the regional organization. Mr. Yett was made chairman of organization work in Oregon, and D. L. Carpenter, Ross Island Sand and Gravel Co., Portland, was made chairman of districting in that state. George W. Gauntlett, Pioneer Sand & Gravel Co., Seattle, Wash., was named chairman of organization and districting in Washington. George F. Jacoby, Helena Sand & Gravel Co., Helena, Mont., called Montana producers together for a meeting on Jan. 3.

States Make Highway Awards

Progress in the award of contracts for public-works highway construction has been so rapid in many states as to leave only small balances of the appropriated funds still available for allotment. At the end of the year 64 per cent. of the $400,000,000 provided for emergency construction of highways by the National Industry Recovery Act had been taken up in work advertised for contract or started by day labor employed directly by the highway authorities. Kansas had awarded to contract all the work possible with the funds available. There are 26 other states that have exceeded the average rate of progress in putting the road money to work as indicated by reports of work advertised for contract or started by day labor.

A total of 5,287 projects, estimated to cost $273,849,000, had been advertised for contract or begun with day labor up to Dec. 30, 1933. The cost of the day-labor projects included in the above is estimated at $20,160,000.

Of the total number of projects approved by the federal bureau, 2,752 were under construction at the end of the year and 476 were completed. The work under construction, which is estimated to cost $159,575,000, was giving regular employment to nearly 130,000 men at the turn of the year.

250-Pound Stones Sized by a Vibrating Screen in Delaware Plant

T. C. Hubbert & Co. Use Vibrating Equipment for All Their Screening

THE T. C. Hubbert & Co. quarry just outside Wilmington, Dela., is located on the banks of historic Brandywine Creek. The only entrance to the plant is by way of Park Drive winding through the "zoo" and beautiful Brandywine Park, which has been maintained in its natural state and is noted for its beauty. Although most of the state of Delaware is flat, the upper portion where this quarry is located is quite hilly and is one of the highest points in the state.

This location is very desirable, due to the numerous markets which can be reached, and as the plant is arranged for both motor-truck and railroad shipments, stone can be supplied to four states: Delaware, Pennsylvania, Maryland and New Jersey. It is also just a few miles from Delaware River, where many thousand tons of rip-rap stone are used from time to time on government projects and river improvements, piers, etc.

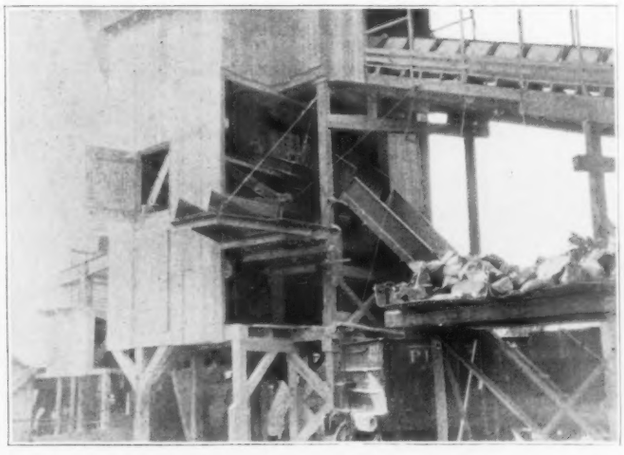
The quarry was opened in 1902 and since then has supplied much of the crushed stone used in the vicinity. For many years an average total production of about 100,000 tons of stone yearly going through the crusher has been maintained, of which 15 per cent. has been building and masonry stones weighing from 25 to 150 lb. each, another 10 per cent. of the total is used for jetty and dyke work, with pieces weighing from 50 to 250 lb. each, and the remainder is crushed to make the usual sizes of concrete stone for highway purposes and also chips and other sizes to meet various specifications.

In addition to all this a considerable quantity of extra-large rip-rap stone is also shipped, pieces weighing from 250 to 20,000 lb. each. This material is loaded directly into freight cars in the quarry by means of a steam derrick and therefore never goes through the plant.

An interesting feature of this plant is the special vibrating scalping screen over which the building and masonry stones and also the jetty and dyke stones are passed. Prior to the installation of this screen it was believed impossible that a vibrating screen could handle bowlders weighing up to 250 lb. each. All this material was formerly hand-loaded in the quarry, for which operation from 15 to 25 men were required.

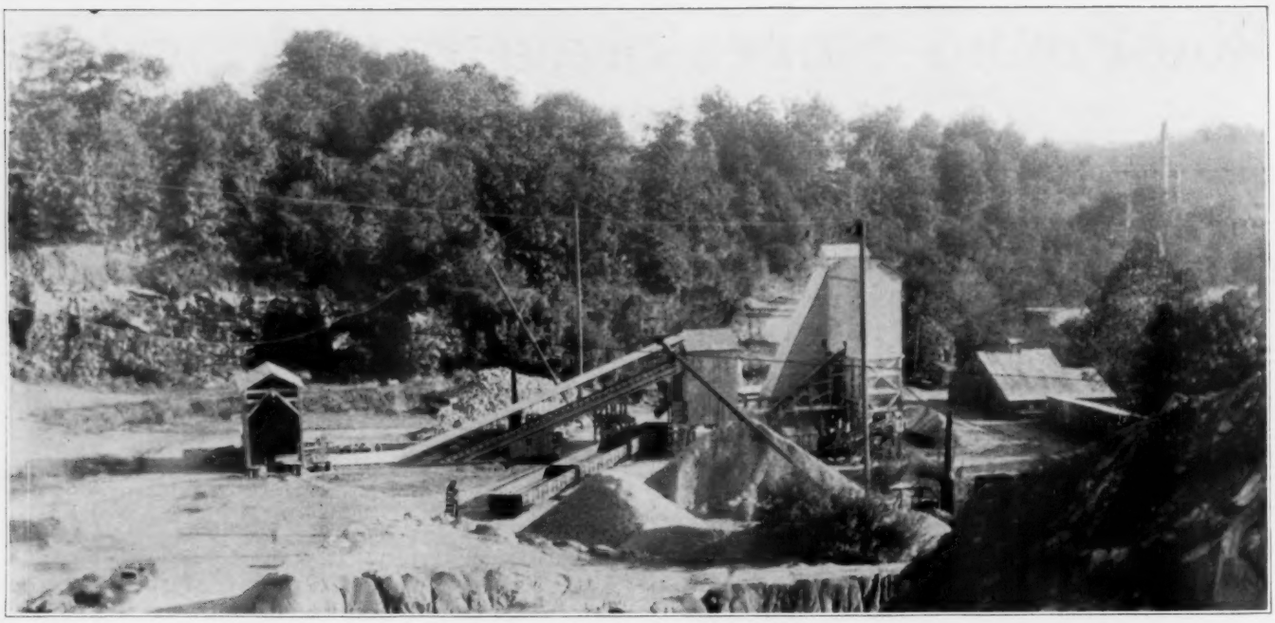
In supplying stone to the government for jetty and dyke work—which must be from 50- to 250-lb. pieces—the material was loaded on freight cars by the men in the quarry and then hauled to the marine terminal, where it was loaded into large barges and towed out into the river to the job. It was at this point that the government inspectors rejected several barge-loads due to the stone being undersized and it was then necessary to have the barges towed back to the wharf, their contents unloaded into freight cars, hauled back to the plant and put through the crushing plant, which was very costly.

It was with the idea of eliminating this hazard and of saving on labor that it was decided to install the above-mentioned screen, and in January, 1931, a 4-ft. by 8-ft. single-deck special Niagara scalping screen with 9-in. by 9-in. clear openings was purchased. Instead of a woven-wire screen cloth on this machine, individual special steel bars of 1½-in. diameter are used, and each is bolted independently into the machine so that a bar can be replaced separately without disturbing the others. Where the bars cross one another only one is crimped to an extent equal to about one-half its diameter. This makes a rough top surface and trips the near-size stone and keeps the smaller pieces from going over. At times this clear opening is changed to 9 in. by 12 in. This machine is operating at 950 r. p. m. and is driven by a 7½-hp. General Electric motor through a triple Dayton Cog-belt drive. It has now been in use three full seasons and there has been no maintenance expense except, of course, replacement of the screen bars.



Close view showing rip-rap being loaded from primary scalping screen into car. Conveyor from primary crusher to screen above.

The plus material from this machine goes directly into freight cars and is shipped to the job; it is, therefore, never touched by hand labor. Since this installation was made Mr. Hubbert has had no rejections and, as a matter of fact, the government inspectors have complimented him on the uniformity of his material. There



General view of T. C. Hubbert & Co. plant showing primary crusher building at left. Note plant setting surrounded by the scenic beauty of a city park.

is probably no other vibrating screen in the country handling such large material.

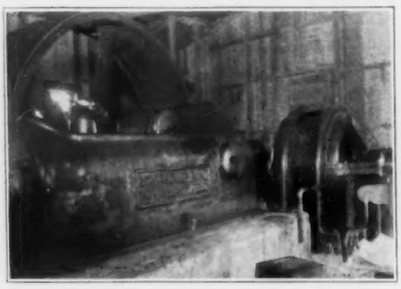
When he installed this machine, Mr. Hubbert decided to change the entire screen equipment and therefore took out the revolving sizing screens and replaced them with four Niagara vibrating screens. All this work, and more especially the installation of the special Niagara scalper, was costly, as it required tearing down the entire scalper building and making it higher and larger. The head pulley of the main conveyor from the primary crusher also had to be raised about 8 ft.

The quarry face is about 135 ft. high and 1,000 ft. long and is of solid formation with no dirt seams. The rock is a gneiss which is very abrasive, and weighs 171.5 lb. per cu.ft. solid. The stripping averages about 8 to 10 ft. of ordinary dirt which is easily removed by a Marion Model 32 steam shovel having a 1¼-cu.yd. dipper. This stripping need not be carefully done, as the quarry dirt is removed through a ⅜-in. clear square opening on the lower deck of the second scalper before the material goes through the secondary crushers.

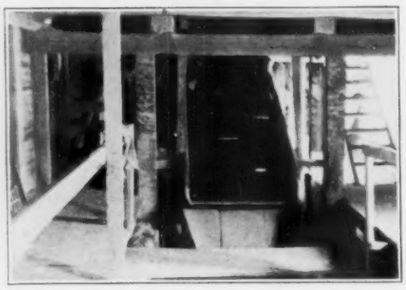
The 1¼-cu.yd. steam shovel which loads quarry trucks.

The bench-drilling method is used and only about a 20-ft. depth is shot at one time. About 40 shots a year are necessary, and these require about 25 tons of 40-per cent. quarry gelatine dynamite per year. Block holes are drilled for secondary blasting, this work being minimized by the use of bench- instead of well-drilling. Ingersoll-Rand X71 drills are used.

A 1¼-cu.yd. Marion steam shovel loads this stone into 7½-ton special Mack trucks equipped with Easton steel bodies, oversize axles and double frame channels. These trucks deliver the material to the Allis-Chalmers 42-in. by 48-in. primary crusher. When jetty and dyke stone weighing a maximum of 250 lb. is being made, the opening is set for 8½ in. When making only the building and masonry or the regular crushed stone, the opening is set at 5 in. This crusher is operated by a 150-hp. Allis-Chalmers motor. All the material coming from it, regardless of size, is delivered to a 36-in. Link-Belt belt-conveyor which is set at about 18 deg. slope and on 152-ft. centers and is driven by a 40-hp. General Electric motor. It handles the large 250-lb. bowlders satisfactorily. Quaker City 7-ply conveyor belting is used.



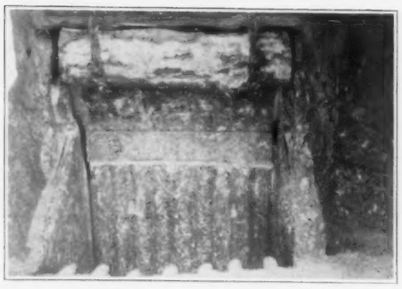
Air compressor which supplies air drills, showing belt drive and motor.



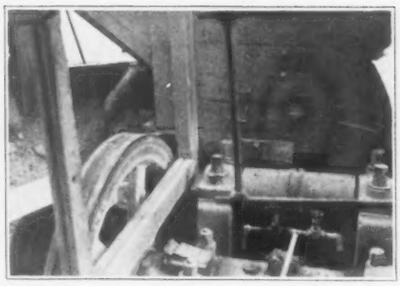
The triple-deck vibrating sizing screen; oversize goes to third reduction crusher.

From this conveyor the material is discharged into a large stone box and then on the 4-ft. by 8-ft. special Niagara scalper described above. When railroad shipments are being made of either the dyke and jetty stone or the masonry and building stone, which in either case is the

plus material from this scalper, the material is fed directly to freight cars, as has been previously stated. When making no shipments or when shipping by truck, this material is delivered from the screen into skips, which are then picked up by a steam derrick and then dumped either into the trucks or on the stock-pile.



Looking down into the opening of the primary jaw crusher.



View of top of one of the three jaw-reduction crushers.

The material which goes through the 9-in. by 9-in. openings on this special scalper goes to another 4-ft. by 8-ft. double-deck Mogul Niagara scalping screen directly underneath. This machine is also operated by a 7½-hp. motor through a dual Dayton Cog-Belt drive. The openings on the top deck of this second scalper are 2¼ in. square in the clear and on the lower deck ⅜ in. square. Some of the material coming to this machine is also very large and heavy, as many elongated pieces, which will weigh up to 150 lb. each, fall through the 9-in. by 9-in. openings above. However, this scalper has also operated continuously for the last three years without maintenance expense except for the screen cloth.

The plus 2¼-in. material from the top deck of this second scalper goes direct to two reduction crushers. The minus 2¼-in. and plus ⅜-in. from the lower deck goes direct to the elevator running up to the screen-house. The minus ⅜-in. material goes through into a dirt bin and is then hauled away to the dump; therefore, if there should be any quarry dirt in the material it is taken out before going over the finishing screens. This also results in very clean screenings.

The two 24-in. by 13-in. Farrell-Bacon reduction crushers take the plus 2¼-in. material from the second scalper and discharge it to the same elevator, which is of the continuous-bucket type with 18-in. buckets mounted on a 20-in. belt and runs at a speed of about 200 ft. per min. It was also furnished by the Earle C. Bacon Co.

The two secondary reduction crushers with third reduction crusher in background.

The material from this elevator is discharged into a stone box which supplies a 4-ft. by 7-ft. triple-deck standard Niagara screen over the bins. The top deck of this screen acts as a scalping screen and returns the plus material to a third reduction crusher, which is a 20-in. Farrell-Bacon. From this crusher the material also is discharged to the same eelvator and goes back to the 4-ft. by 7-ft. triple-deck screen, forming a closed circuit. A 150-hp. General Electric motor drives the two 24-in. by 13-in. crushers, the 20-in. by 6-in. crusher and the 18-in. bucket-elevator.

The 4-ft. by 7-ft. triple-deck screen is driven by a 5-hp. General Electric motor through a Dayton Cog-Belt drive. The openings on the top deck vary from 3¼ in. to 2 in. square; the middle-deck openings from 1¾ in. to 1¼ in. square, and the lower-deck openings from 1¼ in. to ¾ in. square. Directly under this screen is a 4-ft. by 8-ft. double-deck standard Niagara machine which is also operated

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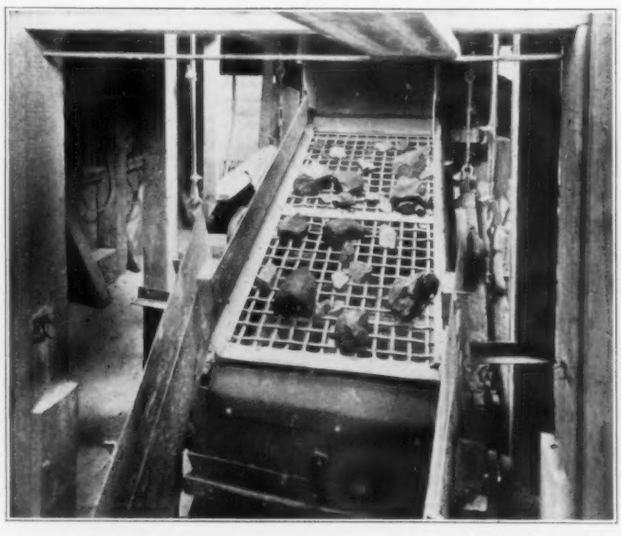
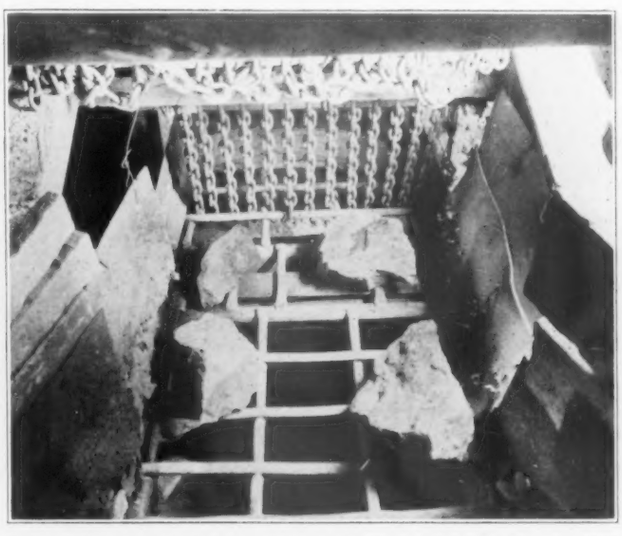


The double-deck secondary scalping screen showing oversize which goes to the two secondary reduction crushers.



The primary scalping screen showing the 9-in. by 9-in. openings and the large sizes of stone retained on them.

Cement Manufacturers at Work Under Code Approved by Roosevelt

Provides 8-Hour Day and 42-Hour Week and Hourly Rates of from 30 to 40 Cents

THE Code of Fair Competition for the cement industry, presented to the National Recovery Administration at a formal hearing on Sept. 15, 1933, was approved by President Roosevelt on Nov. 27 and became effective on Dec. 7, 1933.

It provides minimum rates of pay of 30 c. an hour in Districts 6 (Virginia, Tennessee, Alabama, Georgia, Florida and Louisiana) and 9 (Texas); 37 c. in St. Louis County, Minn., and Ralls County, Mo.; 38 c. in Jefferson and Meade Counties, Ky.; and 40 c. in all other parts of the country.

With certain exceptions, the maximum hours of labor are fixed at 42 in any one week and 8 in any one day and 36 per week averaged over any half calendar year.

As the code in its final form differs materially from the draft published in PIT AND QUARRY (October, 1933, p. 22-24 and 38-39, and November, 1933, p. 34-36, 38), it is published here in full, except for Exhibit "B" which was published as Exhibit "C" on p. 36-38 of the November issue.

CODE OF FAIR COMPETITION FOR THE CEMENT INDUSTRY

ARTICLE I—PURPOSE

To effectuate the policies of Title I of the National Industrial Recovery Act the following provisions are submitted as a Code of Fair Competition for the Portland-cement industry, and upon approval by the President shall be the standard of fair competition for such industry, and shall be binding upon every member thereof.

ARTICLE II—DEFINITIONS

1. The term "Portland-cement industry" as used herein includes the manufacture and sale by manufacturers of Portland cement.

2. The term "employee" as used herein includes anyone engaged in the Portland-cement industry, in any capacity, receiving compensation for his services, irrespective of the nature or method of payment of such compensation.

3. The term "employer" includes any enterprise by whom any such employee is compensated or employed.

4. The term "member of the industry" as used herein includes any enterprise engaged in the industry as above defined.

5. The term "district" as used herein means the geographical producing district as now or hereafter designated by the United States Bureau of Mines or other governmental agency, or as may hereafter be determined by the Code Authority.

6. The term "productive capacity" as used herein shall mean the productive capacity of the industry as determined by the United States Bureau of mines.

7. The term "institute" as used herein shall mean the Cement Institute.

8. The term "board" as used herein shall mean the Board of Trustees of the Cement Institute.

9. The term "plant" as used herein shall mean a Portland-cement manufacturing plant.

10. The terms "President" and "Act" and "Administrator" as used herein, shall mean respectively the President of the United States, the National Industrial Recovery Act, and the Administrator of said Act.

ARTICLE III—LABOR

A. General.—1. Pursuant to subsection (a) of Sec. 7 of the Act, and so long as this code shall be in effect:

(a) Employees shall have the right to organize and bargain collectively through representatives of their own choosing, and shall be free from the interference, restraint, or coercion of employers of labor, or their agents, in the designation of such representatives or in self-organization or in other concerted activities for the purpose of collective bargaining or other mutual aid or protection;

(b) No employee and no one seeking employment shall be required as a condition of employment to join any company union or to refrain from joining, organizing, or assisting a labor organization of his own choosing;

(c) Employers shall comply with the maximum hours of labor, minimum rates of pay, and other conditions of employment, approved or prescribed by the President.

2. No person under 16 years of age shall be employed, and no person under 18 years of age shall be employed in any hazardous occupation, in the industry.

3. Within each state, no provisions of this code shall supersede any laws of such state imposing more stringent requirements, regulating the age of employees, wages, hours of work, or health, fire, or general working conditions, than are imposed under this code.

4. Employers shall not reclassify employees or duties or occupations performed by employees to defeat the purposes of the Act.

B. Hours.—1. Except as hereinafter otherwise provided, on and after effective date no employee shall work or be permitted to work in excess of 42 hr. in any one week or 8 hr. in any one day; nor more than 36 hr. per week averaged over any half calendar year, excepting, however (a) employees engaged in emergency maintenance and repair work involving breakdowns or protection of life and property, and (b) employees in packing and shipping departments, who shall not, however, work more than 10 hr. in any one day or 36 hr. per week averaged over any half calendar year. If any employee on an hourly rate works in excess of 36 hr. per week averaged over any half calendar year the wages paid for such excess shall be at the rate of not less than one and one-third times the regular hourly rate.

2. No clerical or office employee shall work or be permitted to work in excess of 40 hr. in any one week.

3. The maximum hours specified in the foregoing sections of this article shall not apply to executive, administrative, supervisory, or technical employees who are paid $35 or more per week, nor to sales staff employees.

4. No employee shall be permitted to work for a total number of hours in excess of the maximum hours specified in the foregoing sections of this article whether employed by one or more employers.

C. Wages.—1. Except as hereinafter otherwise provided, no employee shall be paid at less than the hourly rates specified for each of the 12 geographical districts as set forth in exhibit "A" of this code, as follows:

District Number:	Minimum Wage per Hr.
1	40 c.
2	40 c.
3	40 c.
4	40 c.
5 Except (a)	40 c.
(a) Jefferson and Meade Counties, Ky.	38 c.
6	30 c.
7 Except (a) and (b)	40 c.
(a) St. Louis Co., Minn.	37 c.
(b) Ralls County, Mo.	37 c.
8	40 c.
9	30 c.
10	40 c.
11	40 c.
12	40 c.

2. When the hourly rate for the same class of work on July 15, 1929, was less than 40 c. per hr., employers shall not pay less than the hourly rate on said date and in no event less than 30 c. per hr.

3. Untrained labor for a period not exceeding 3 mo. and employees who by reason of old age or physical infirmities are not capable of normal productive effort shall be paid not less than 80 per cent. of the minimum wage rates, but the total number thereof at any one plant shall not exceed 5 per cent. of the total number of employees engaged by any employer in any one plant at any one time.

4. The foregoing provisions of this section established a minimum rate of pay regardless of whether an employee is compensated on a time rate, piece rate, or other basis. The rates of pay hereinbefore provided shall not be understood to be the maximum rates of pay for the respective districts.

5. The amounts by which wages in the higher paid classes of employees have exceeded wages in the lower paid classes of employees, shall be maintained, having in view long-standing wage differentials.

6. Female employees shall not be employed after 6:00 p.m.

7. Each employer shall post at a conspicuous place at each plant the minimum wages and maximum hours under this code.

ARTICLE IV—ADMINISTRATION

To effectuate further the policy of the Act a Code Authority is

hereby constituted to coöperate with the Administrator in the administration of this code.

A. Organization and Constitution of the Code Authority.—The Code Authority shall consist of 7 individuals, or such other larger number as may be approved from time to time by the Administrator, to be selected as hereinafter set forth. The President, in his discretion, may appoint not more than 3 additional members without vote to represent the Administrator.

1. The board shall elect the Code Authority. The persons so elected shall, subject to changes at any time by the Board, serve on such Code Authority for such term as the board shall determine.

The board shall be made up as follows:

(a) One member to be chosen from each district.

(b) Trustees at Large, not to exceed 7 in number, shall be chosen by those members of the Board who represent the cement districts.

(c) The president, the vice-presidents, and the treasurer of the institute shall be *ex officio* members of the Board with full power to vote.

The members of the board to represent the cement districts shall be elected by the members of the industry who participate in the activities of the Code Authority, as provided in Sec. B, subsection 8 below, in the respective districts by a majority vote of such members in each such district to serve for the term of 1 yr. and until their successors are elected and have qualified, and the members of the board, so elected, shall elect the trustees at large; provided, however, that any member of the board elected to represent any cement district may be recalled by a majority vote of the members of the industry in any such cement district in the event of the change in status of such trustee or if, for any other reason, any such trustee is not considered to be representative of the members of the industry in such district and, in the event of such recall, such members shall elect, by a majority vote, a trustee to fill the unexpired term of the trustee who has been recalled; a majority of the members of the board shall have like power with respect to any trustee at large.

In the event of a vacancy in the board such vacancy shall be filled for the unexpired term of the trustee whose vacancy is to be filled in the same manner as such trustee was elected a member of the board.

In the event of the inability of any trustee elected to represent a cement district, or of any trustee at large to attend any meeting of the board or of the institute or of any committee or committees thereof, the members of the industry in such district, with respect to trustees representing cement districts and the other trustees at large, with respect to any such trustee at large, shall have the right, from time to time as the occasion may require, to elect an alternate trustee to attend any such meeting or meetings who shall have such authority to represent the members of such district or to act as trustee at large as may be prescribed by such members or by such other trustees at large. Within the limits of the authority conferred upon him, as herein provided, any such alternate trustee shall have the right to vote and to act in all respects in the place of the member of the board whose place he fills.

2. The institute or its successors or any trade or industrial association participating in the selection or activities of the Code Authority, shall:

(1) Impose no inequitable restrictions on membership;

(2) Submit to the Administrator true copies of its articles of association, by-laws, regulations, and any amendments when made thereto, together with any other information relating to membership, organization, and activities as the Administrator may deem necessary to effectuate the purposes of the Act.

3. In order that the Code Authority shall at all times be truly representative of the industry, and in other respects comply with the provisions of the Act, the Administrator shall provide such hearings as he may deem proper; thereafter if he shall find that the Code Authority is not truly representative, or does not in other respects comply with the provisions of the Act, he may require an appropriate modification in the method of selection of the Code Authority.

B. Powers and Duties of the Code Authority.—In addition to the powers and duties herein specifically conferred upon the Code Authority, it shall have the following duties and powers to the extent permitted by the Act and subject to the right of the Administrator by review to disapprove or modify any action taken by the Code Authority pursuant to this code.

1. The Code Authority shall be the general planning, coördinating, and administering agency of this code. It may make such rules and regulations as may be necessary for the conduct of its business in the administration of this code.

2. The Code Authority may designate the institute or such other committees or agents, and may delegate to them such of its powers as it may deem necessary for the administration of this code; provided, however, that the Code Authority shall not be relieved of final responsibility with respect to any such delegated powers.

3. The Code Authority shall, upon complaint of interested parties, upon request of the Administrator, or upon its own initiative, make such inquiry and investigation as to the operation and observance of this code as may be necessary and report the results thereof to the Administrator for such action by him as may be in accordance with law.

4. No member of the Code Authority or of any committee designated by it shall participate as such member in a proceeding in which he is interested, either as complainant or as respondent, or in which he is in any other manner directly interested; and in the event of any such disqualification, the remaining members of such Code Authority or committee shall certify such disqualification, together with the reasons therefor, to the president of the institute, who shall promptly designate a person to sit as a special member of such Code Authority or committee for the purposes of any such proceedings; provided, however, that any such special member so appointed shall be selected from the same group of the industry as is represented by the member whom he replaces.

5. In order that the President may be informed of the extent of the observance of the provisions of this code and of the extent to which the declared policies of the National Industrial Recovery Act are being effectuated in the industry, the Code Authority and members of the industry shall make such reports as the Administrator may require periodically or as often as he may direct. Each member of the industry shall make such sworn or unsworn reports to the Code Authority or to such agency as it may designate as to wages, hours of labor, number of employees, and such other matters as the Code Authority may require for the administration of this code; provided, however, that any information furnished hereunder of a confidential nature as between competitors in the industry shall not be available to competitors nor published in such form as shall reveal the identity of any member of the industry furnishing such reports.

In addition to the information required to be submitted to the Code Authority, there shall be furnished to governmental agencies, such statistical information as the Administrator may deem necessary for the purposes recited in Sec. 3(*a*) of the Act.

6. Any interested party shall have the right to complain to the Code Authority under such rules and regulations as it may prescribe in respect of any rule, regulation, order or finding made or course of action pursued by the Code Authority, and any interested party shall have the right to appeal to the Administrator under such rules and regulations as he may prescribe in respect to any decision, rule, regulation or course of action of the Code Authority, pursuant to any provision of this code.

7. The Code Authority and/or the board may, from time to time, make such recommendations to the President as it may deem advisable or necessary to effectuate the policy of the Act and to develop and maintain conditions of fair competition in the industry; and any modification or additions to this code recommended by the Code Authority and/or the board shall, upon approval by the President, become part of and shall have the same force and effect as other provisions of this code.

8. Any member of the Industry shall be entitled to participate in and share the benefits of the activities of the Code Authority, and to participate in the selection of the members thereof by assenting to and complying with the requirements of this code and by either paying his reasonable share of the expenses of its administration or by becoming a member of the institute. The reasonable share of expenses of administration shall be determined by the Code Authority subject to review by the Administrator on the basis of volume of business and/or such other factors as may be deemed equitable to be taken into consideration.

Article V—Safety Work

As an evidence of the general attitude of the industry toward its employees, the industry points with pride to its achievements in the field of safety. For many years the industry has occupied the premier position in safety accomplishments. It has been regarded as an exemplar in safety technic; it received the Joseph A. Holmes awards for the years 1930 and 1932, which is more notable because during those declining and depression years great difficulties were experienced in maintaining normal safety *morâle* in plant organizations. Such results, in the opinion of the industry, can be attained only by the coöperative effort of constructive management and satisfied, intelligent employees. The safety movement in the industry is conducted by, and for many years has been one of the constructive activities of, the Portland Cement Assn., an organization of the industry which is devoted to research, education and improvement and extension of the use of concrete. So far as practicable, the safety movement will be continued.

Article VI—Plan for Sharing Available Business

1. The board is hereby authorized to formulate a plan or plans, within 30 days after the effective date of this code, unless such time shall be extended by the Administrator, for the equitable allocation of available business among all members of the industry or among members of the industry operating in one or more districts, and for the control of cement inventory and to submit the same either to a meeting of all members of the industry or to meetings of members in the districts affected, as the board may determine, for approval, modification or rejection. Each member of the industry shall be entitled to receive notice of any such plan and to participate in any meeting or meetings of all members of the industry or of members in the district in which such member operates and, further, shall have the right to appear before the board at any meeting at which any such plan is being considered for the purpose of presenting any facts or arguments relative thereto.

When any such plan shall have been formulated by the board, the Code Authority shall present the same to the Administrator for consideration and the Code Authority shall represent the industry and the board in conference with the Administrator with respect to any such plan; provided, however, that as regards any such plan the Code Authority shall have only such power to bind the industry or any subdivision thereof as shall have been conferred upon it by majority vote of the industry or of any subdivision thereof, and each member shall have the right to present his objections, if any, to the Administrator. The Code Authority shall collect and present to the Administrator such data and statistics as may be required in connection with any such plan together with a statement of the names of those members of the industry that approve and of those that disapprove such plan in whole or in part.

2. Any such plan shall be based on the following principles:

(a) It shall be fair and its benefits shall be equitably apportioned to all plants.

(b) It shall give due consideration to all pertinent factors including demonstrated productive capacity based on the clinker- and/or cement-production performance of non-obsolete plants and equipment.

(c) It shall in no way reduce the total production of all plants below what is necessary amply to supply demand.

(d) It shall not promote monopoly or monopolistic practices or oppress small enterprises.

ARTICLE VII—INCREASE IN PRODUCTIVE CAPACITY

Prior to the construction or operation of a new plant, or the increase in the productive capacity of an existing one, or the movement of all or part of such a plant from one place to another, the Cement Institute, on receipt of such information, shall promptly collect complete information concerning existing productive capacity in the area in which the proposed new plant is to be located, together with data concerning consumption of cement in that area. If these data disclose that such new plant will result in further increasing the problem of over-production or over-capacity in such area, the Cement Institute may petition the President to prohibit the construction, or operation, of the proposed new plant, or the increase in manufacturing capacities of such existing plants. The provisions hereof shall not be construed to prevent the modernization of existing plants to improve quality of product and/or operating efficiency.

The board may study the problem of permanent excess of productive capacity in any area and may from time to time prepare and submit to the Administrator for consideration plans for the closing down or amortization of the less economical plants.

ARTICLE VIII—COST PROTECTION

1. It shall be an unfair method of competition for any member of the industry to sell or offer to sell cement at less than his expenses of manufacture, provided, however, that any member of the industry may sell or offer to sell cement at below his own expenses to meet the competition of any other member of the industry whose price is not less than the expenses of manufacturing of such other member.

Manufacturing expenses as used herein, shall include all direct labor and material (which do not greatly vary per unit of production with volume of output), at cost or market whichever is lower, plus a proportionate share of all indirect expenses, inclusive of maximum depreciation and/or depletion allowances computed according to federal income-tax procedure, but exclusive of any capital reserves, for purposes other than depreciation and/or depletion, and exclusive of interest paid and development expenses. Provided, that the distribution of such indirect expenses per unit of product produced shall be on the basis of an average rate of utilization of plant facilities by efficient producers.

Unless and/or until some other formula is submitted to, and approved by the Administrator, the average rate of utilization of plant facilities shall be determined as follows, to wit:

Each member of the industry shall send to an impartial agency appointed by the Institute, a consolidated income-tax return for that portion (or all) of his operations, devoted to the manufacture of Portland cement for each of the years 1927-1932, or such other period as, upon presentation of official data, may be determined to be fair and as will better effectuate the purpose hereof and be approved by the Administrator, together with a record of physical production, productive capacity, and sales in each of these years.

From these reports will be calculated the average rate of utilization of productive capacity by the one-third portion of the industry which reported the lowest average per unit cost of production for such period.

This percentage of productive capacity (rather than full capacity) shall become standard for the distribution of indirect expenses and fixed charges for the purpose of determining the per unit manufacturing expenses, by every member of the industry.

2. In case of any complaint that a member of the industry has violated the above provisions of this code the Code Authority shall give to such member of the industry not more than 7 days, or such other reasonable time as may be fixed by the Code Authority, in which to present evidence of its compliance with the foregoing provisions. If the Code Authority is not satisfied by the proof furnished by such member, the matter shall be promptly referred to the Administrator, who shall immediately select a certified public accountant to examine the cost-accounting of the member of the industry complained against and notify such member of the selection made and request the consent of such member to the examination of its cost-accounting by the certified public accountant so selected. If such member shall not, within 2 days after receipt of notice from the Administrator, as above provided, furnish to the Administrator written consent to such examination or shall not thereafter make available to such certified public accountant all books and records necessary to complete the examination of the cost-accounting of such member of the industry, then, and in either event, the Administrator shall forthwith refer the matter to the Federal Trade Commission which shall audit the cost-accounting of such member of the industry and report to the Administrator, who may transmit a copy of such report to the Code Authority and to the member of the industry complained against, with the least practicable delay. In the event that the member of the industry complained against shall consent to the examination of its cost-accounting by the certified public accountant selected by the Administrator after such accountant shall complete his report, such accountant shall report his findings to the Administrator and transmit a copy thereof to the Code Authority and to the member of the industry complained against. If, in the opinion of the Administrator, the report of such accountant shall sustain the contention of the Code Authority but is not acceptable to the member of the industry complained against, then the matter shall be referred by the Administrator to the Federal Trade Commission, as above provided. The decision of the Administrator on the report of the accountant selected by him or on the report of the Federal Trade Commission shall be final regarding the costs of the member of the industry complained against.

3. *Uniform Cost-Accounting.*—The Code Authority shall prepare and adopt for general use throughout the industry, and submit to the Administrator for approval within 30 days of the effective date hereof, a standard method or system of uniform cost-accounting which shall specify all items and include all elements of manufacturers' cost. When so prepared, adopted, and approved, all members of the industry shall apply the principles and include all the elements thereof in determining their respective costs.

ARTICLE IX—OPEN PRICE—MARKET STABILIZATION

1. Each member of the industry shall file its prices and all terms and conditions of sale with the Code Authority within 5 days after the effective date of this code and make same public by broadcast quotations to the trade, so that competitors, the trade, and the buying public may at all times have accurate information relative thereto, and no member of the industry shall deviate therefrom except in the manner hereinafter provided.

2. Any member of the industry may from time to time change or revise its prices by filing notice thereof with the Code Authority; and no member of the industry shall anticipate, by quotation, sale, contract, or otherwise, any change or revision until after the same shall have been on file at least 5 days at the office of the Code Authority. At the expiration of such 5-day period the said changes or revisions may, unless the effective date thereof shall be extended, be made effective, and thereupon shall be made public in the manner provided in Sec. 1 hereof.

3. Any member of the industry may meet the prices, terms, and conditions of sale, established by the above method, as of their effective date, and no member of the industry shall deviate from the prices, terms, and conditions of sale, so established, except in the manner above stated, and all members meeting such changes shall make same public in the manner provided in Sec. 1 hereof.

4. *Manner of Procedure on Price Changes.*—(a) (1) Declines shall be retroactive on all shipments made within 5 calendar days before the effective date thereof.

(2) Advances shall be made effective 5 calendar days after expiration of the notice period and the trade shall be given such notice.

(b) During the 5 days prior to the effective date of an advance, current market orders may be booked at the prior price for shipment not more than 15 days from the date the advance becomes effective.

(c) Each specific work quotation shall contain a provision permitting withdrawal on 5 days' notice.

(d) After an advance in price all outstanding quotations on work for which bids have been opened, which quotations extend longer than 15 days from the effective date of the new price, shall be withdrawn or revised to expire on such fifteenth day.

(e) All quotations at the prior price, made during the 5-day notice period shall be confined to jobs on which bids are to be opened prior to 10 days from the effective date of the new price. Such quotations may be closed by contract not later than 15 days from the effective date of the new price.

(f) All quotations outstanding on jobs on which bids are to be opened later than 10 days from the effective date of the new price shall be withdrawn, and any quotations made on such jobs during the 5-day-notice period shall be at the new price.

5. If the Code Authority has reasonable cause to believe, and the member filing same shall have been so notified, that any price filed at its office, as above provided, represents a price made pursuant to a violation of any provision of this code, the Code Authority may, by notice to such member, extend the effective date of such price for a period of not more than 10 days in order that investigation may be made by the Code Authority pursuant to the provisions of Sec. 2, Article VIII.

ARTICLE X—UNFAIR COMPETITION

For the purposes of this code, the following acts shall constitute unfair trade practices and a violation of this code:

1. Making or promising any bribe, gratuity, gift, or other remuneration, not filed and published in accordance with Article IX hereof, directly or indirectly to any purchaser or prospective purchaser or to any officer, employee, or representative thereof, for the purpose or with the effect of making a sale of cement; imitating any brand or trade-mark used by any competitor; inducing or attempting to induce in any manner the violation of any existing future-sales order or future-sales contract, or other existing contract between a member of the industry and his customer, with the purpose or effect of inducing or causing a breach of any such contract; circulating or disseminating false or misleading information by words or acts relative to the prices, credit standing, business integrity, or ability to perform contracts, of any competitor or the grade, quality, count, character, nature, origin, manufacture, weight, or preparation of his products.

2. To compensate salesmen in any manner other than upon a fixed salary and full-time basis.

3. To divert or permit purchasers or users of cement to divert shipments of cement from one destination to another destination, the result of which will enable the purchaser or user to secure cement at less than the member of the industry's published market price at the point of final destination.

4. The following practices, undertaken for the purpose or with the effect, directly or indirectly, of furthering the sale or use of a particular brand of cement shall constitute unfair trade practices

and a violation of this code:

(a) Except with permission of the Code Authority (and such permission, when given, shall apply to all companies in the marketing area affected) the purchase, by any member of the industry, of bonds, or other securities, issued for the financing of constructive work, either in the name of the member of the industry, its subsidiaries, or of individuals, or officers, connected therewith, or the acceptance of such bonds, or other securities, in payment, wholly or in part, for cement, or the advance, loan, or payment of any monies by a member of the industry for the purpose of inducing the purchase of cement, or to assume cost of bidders' bonds or to endorse or guarantee or in any way relieve a bidder of the responsibility for or the expense of providing such bonds, unless such conditions shall have been filed and published in accordance with Article IX.

(b) For the purpose or with the effect of evading the provisions of Article IX of this code, the purchase of fuel or other supplies, either directly or indirectly, or in the name of the company, or its subsidiaries, or of individuals, or officers connected therewith at prices above the market price thereof at the time of purchase.

(c) To make or permit to be made, either directly or indirectly, any secret payment or allowance of rebates, refunds, commissions, credits, or unearned discounts in the form of money or otherwise, or to secretly extend to certain purchasers special services or privileges not extended to all purchasers on like terms and conditions.

(d) The prepayment of transportation charges on shipments consigned to other than the member of the industry itself, except in the case of railroad freight charges to stations to which regulations require prepayment from any shipping point, or the payment of demurrage charges by any member of the industry on such shipments; provided, however, that the foregoing provision, except as to demurrage charges, shall not apply to shipments purchased directly by and consigned to departments of the United States or state governments, unless such conditions shall have been filed and published in accordance with Article IX.

(e) Knowingly diverting or permitting to be diverted to other uses, cement shipped for a specific-work project nor knowingly shipping on a specific-work order or contract, an amount of cement in excess of the actual needs of such work.

(f) To entice maliciously the employees of a competitor with the intent or effect of interfering with the conduct of the business of such competitor.

(g) Knowingly to ship cement by any transportation agency which, for the purpose or with the effect of inducing or influencing the sale or purchase of cement, makes payments or concessions by rebates or otherwise.

(h) The payment, or offer to pay, directly or indirectly, any advertising expenses of purchasers or users of cement.

(i) Lavish, excessive, or undignified entertainment of purchasers or users of cement, or others connected therewith; donating funds, or providing banquets or other similar lavish entertainment for purchasers or users, or associations thereof; giving or offering to give premiums, personal gifts, gifts of cement, or gifts of any other commodity of substantial value to purchasers or users of cement.

(j) The sale by any member of the industry, directly or indirectly, of any commodity at a discriminatory price.

(k) Services to purchasers or users are proper under fair competition, if confined within the limits of advice and consultation. The furnishing of articles, or facilities of a definite physical nature, whether by way of loan, lease, gift, or otherwise, resulting in monetary benefit to purchasers or users is discriminatory and shall constitute unfair competition.

(l) No member of the industry shall maliciously refuse to sell to, or maliciously interfere with the business of, dealers or users of portland cement purchased from a competitor, for the purpose of interfering with the conduct of the business of such competitor.

Article XI—Method of Selling and Marketing Cement

The Code Authority may, after the approval of the Administrator has been secured, authorize and approve such exceptions to or modifications of any of the following provisions as it may see fit for all members of the industry in the marketing area affected.

No member of the industry shall discriminate in prices, terms, and conditions of sale at the same time and place of delivery between purchasers or users of cement in the same class and similarly situated.

1. Except as otherwise specified, Portland cement shall be marketed in each community through the building material dealers regularly serving such community.

2. Except as otherwise specified, the following buyers shall be sold direct by members of the industry at the same price and under the same terms and conditions of sales as to dealers:

United States Government.

State governments, counties, and parishes when properly authorized to purchase cement for public improvements or maintenance.

Contractors doing any of the foregoing classes of work, except where such work is located entirely within cities, towns, or villages.

Railroads filing tariffs with state or interstate commissions, and contractors doing work for such railroads.

Owners or contractors buying for power development, flood control, and water-supply projects that do not require dealer service.

Concrete-products manufacturers, including block, tile, roofing, pipe, piling, and all other precast concrete units when for their own manufacturing operations, but not for resale.

Commercial concrete-mixing plants for their own processing operations, but not for resale.

3. *Definition of a Dealer.*—A cement dealer as used herein is one who has an established place of business where he is regularly engaged in selling Portland cement and other building materials to the public, with facilities to serve the retail trade in a given territory and able and willing to perform all functions devolving upon him in securing, performing, and protecting contracts for the delivery of Portland cement for specific work on his account.

No member of the industry shall pay to any dealer any commissions or other remunerations for the sale of such member's cement.

4. Cement shall be marketed on the basis of a barrel, weighing 376 lb. net; and shall be delivered in the following manner:

(a) In cloth or paper sacks, 4 sacks of 94 lb. net each constitute a barrel, or

(b) In bulk computed on weights on scales at the plants or *en route.*

5. Cement shall be marketed either on current or market orders for delivery within 15 days, or on orders or contracts for future delivery beyond 15 days.

Orders entered for 15 days' shipment shall be subject to shipment on the fifteenth day without notice to the purchaser. Quotations on current orders shall be for immediate acceptance.

Cement purchased for delivery beyond 15 days from date of purchase shall be sold either to cover "specific work" or for period requirements.

6. Application of Exhibits B and C. The booking of either specific work orders or period requirement contracts from the various groups of purchasers listed in Sec. 1 and 2 of this article shall be as follows:

(a) *United States Government.*—Sell under contracts for delivery periods as specified in formal requests for bids.

(b) *States.*—Projects on which construction contracts are awarded. Sell under specific work contracts. Such contracts shall be closed only after definite award of construction contracts. On request from states for cement prices on such projects, the prices quoted shall be not higher than the prices in effect 15 days prior to the date on which such states receive construction bids and such prices shall be good for acceptance within 15 days after such date for receiving construction bids.

Purchases for use by State Forces.—If any department of the state undertakes construction work conforming to the general definition of a specific-work project, sell under specific-work contract. For requirements of the character of repairs and maintenance, sell under calendar-quarterly contracts.

(c) *Counties, Parishes, and Cities.*—Sell on calendar quarterly requirement contracts.

(d) *Railroads.*—Sell on calendar-quarterly basis for general requirements. Specific jobs requiring extended delivery may be sold under the plan outlined below for specific-work contracts, provided the jobs are covered by appropriations, plans prepared and it is possible to definitely check the job for location and quantity. Contracts for such specific job shall be limited to shipment for such work only and shall be closed for a period of not to exceed 1 yr. from date of contract. Cement under such specific-job contracts shall not be shipped to any town other than that provided in the contract nor shall it be diverted for use in general repair or maintenance work.

(e) *Owners and Industrials.*—This title includes industrial projects and owners thereof, such as coal companies, manufacturing companies, street railways, packing houses, stockyards, cemeteries, light and power companies, and all public utilities except railroads having published tariffs and recognized by public service commissions as common carriers.

Sell for 15 days' shipment only, on current or market orders; when work is done by the owner or industrial specific contracts shall not be made; when an owner or industrial awards a specific job to a contractor and the contractor buys the cement requirements, specific work contract shall be closed provided the job may be checked definitely as to location and quantity.

(f) Conduit construction or repair work by public utilities shall not be sold for extended delivery but shall be sold for 15-day shipment only on current or market orders.

(g) Speculative residential work shall be sold for current delivery only. Any project involving more than one residence for one owner constitutes a speculative operation.

(h) *Products Manufacturers.*—(1) Manufacturers of blocks, tile, roofing, and all products manufacturers not included in (2) below, shall be sold on calendar-quarterly contracts.

(2) Pipe Manufacturers and Concrete-Pile Manufacturers.—For specific jobs which can be definitely checked for quantity and location, sales shall be made on specific-contract basis. In general such specific contracts shall be confined to public work awarded by contract where the cement requirements can be accurately figured.

An order held by a pipe manufacturer for the year's requirements of a city, county, state, industrial, or contractor shall not constitute a specific job. Such orders as well as general requirements of the plant shall be sold only on calendar quarterly contracts.

(i) *Commercial Concrete-Mixing Plants.*—Shall be sold for 15 days' delivery or for specific-job requirements as herein provided; but shall not be sold for general or period requirements.

7. *Time of Closing Calendar Requirement Contracts.*—Contracts for any quarter shall be quoted or closed not earlier than the first day of the last month of the preceding quarter.

The basis of a contract (except on sales direct from member of the industry to user) shall be a binding order placed by the user with a dealer and a corresponding order placed by the user with a dealer and a corresponding order placed by the dealer with the member of the industry.

8. *Time and Manner of Closing Specific-Work Orders.*—When a contractor has an order with a building-material dealer for a specific-work project, the member of the industry shall book from the dealer a purchase order for the required amount of cement to be invoiced at the member's market price at time of shipments.

This order shall be binding on both parties. The parties shall agree in this order that if the member's price should advance, a specific-work contract shall be entered into at the price prevailing prior to such advance, for the quantity of cement then required to complete the project. The dealer shall furnish the member of the industry, as the basis for such contract, his record of the amount of cement delivered to the contractor prior to the advance in price, together with a verified written estimate from a responsible representative of the contractor of the amount of cement still required to complete the work.

Specific work orders at prices prior to an advance in prices, but closed during the period immediately following an advance, as described in Par. 8, shall be covered immediately by specific-work contracts, but such contracts shall be supported by the dealer's record of prior deliveries and the contractor's written estimate of requirements as above stated.

9. The provisions of this Article XI are designed to meet present industrial and social conditions as they relate to the cement industry. But the Administrator and the Code Authority with the approval of the Administrator reserve the right from time to time, and after such hearing as they or either of them may deem necessary, to modify the foregoing provisions of this article as conditions and circumstances may indicate to be necessary to effectuate the policy and provisions of the Act.

Article XII—Terms and Conditions of Sale

1. All future-sales orders and future-sales contracts for the sale of Portland cement shall contain a definite statement of price, quantities, terms of payment, time and place of delivery, and all other terms of sale necessary to form a complete and unambiguous contract.

2. No member of the industry shall substitute for a contract or purchase order already executed and in force, a new contract or purchase order for the same requirements at a lower price or on more favorable terms to the purchaser than are contained in the original contract or purchase order.

3. Attached hereto and marked Exhibits B and C are forms of future-specific-sales orders, and contracts, the provisions, terms, and conditions of which have been agreed to by members of the industry as representing in substance the best practices within the industry.

4. Terms of payment shall be as follows: A cash discount of not in excess of 10 c. per bbl. may be deducted from invoices paid in full within 15 days from date of issue. Invoices not discounted are payable net 30 days from date of issue.

(a) Where purchases involve frequent shipments, a plan of semimonthly remittance, based on a 15-day average, may be used as follows:

All invoices dated from first day of month to 15th day of month, inclusive, to be paid by the 22d of that month; and all invoices dated 16th to 31st, inclusive, to be paid by the 7th day of the following month.

(b) Cash discount shall not be allowed if remittance is forwarded after the expiration of the 15-day period, or semimonthly period; or if deduction is made in the remittance for cloth sacks to be returned or in transit and not yet credited; or if the remittance consists in whole or in part of notes, trade acceptances, scrip, warrants (whether interest-bearing or not), or any medium other than cash or bankable check for the full amount of the invoices upon which cash discount is deducted.

(c) The postmark date at point of mailing shall determine the date of remittance.

(d) No unearned discounts shall be allowed.

5. Package charges and allowances:

(a) When cement is shipped in cloth or paper sacks the price shall include the member of the industry's published deposit or leasing charges for cloth sacks or the selling charge for paper sacks and payment of such charges shall be required at the same time as the cement.

(b) When used cloth sacks are returned empty to the member of the industry the credit or allowance shall at all times be in accordance with the member's published terms and conditions of sale.

6. Invoices: Invoices shall be dated as of the date of shipment (provided where special and unusual conditions prevail, the members of the industry in the district or districts concerned, may, subject to the approval of the Code Authority, change this provision to conform to such special and unusual conditions) and shall contain full information as to price, quantity, kind of package, terms of payment, place of deliveries, routing, amount of freight allowed, and any other data necessary to show fully all conditions entering into the sale. Any deviation or concession from these conditions is an unfair practice.

Article XIII—Standardization of Products

1. All Portland cement marketed by members of the industry shall comply with the standard specifications for Portland cement of the American Society for Testing Materials, and the American Standards Assn., and/or the Federal Specification Board. Members of the industry may sell cement under modified Portland cement specifications that are designed to meet special or unusual conditions not adequately or properly covered by the specifications hereinabove referred to, provided, however, that the price at which such modified Portland cements are sold shall be filed with the Code Authority.

2. Every member of the industry shall guarantee his products to comply with all the conditions of the specifications under which they are sold, but shall not be responsible for the improper use of cements and therefore shall not guarantee finished work, nor shall the member of the industry be responsible for condition of product after delivery.

3. No member of the industry shall pay or absorb, directly or indirectly, any charges for inspection or tests made by or on behalf of the purchaser to determine compliance with specifications therefor.

Article XIV

It is the concensus of opinion of the industry that each member thereof should bear his proportionate share of the burden of the cost of constructive cooperative activities approved and supported by the majority of the industry and whose benefits are common to all manufacturers.

Article XV

Nothing in this code contained, excepting, however, the provisions of Article III, shall be deemed to apply to or affect the sale by any member of the industry of any products of the industry for direct shipment in export trade.

Article XVI—Modification

1. This code and all the provisions thereof are expressly made subject to the right of the President, in accordance with the provisions of subsection (b) of Sec. 10 of the National Industrial Recovery Act from time to time to cancel or modify any order, approval, license, rule or regulation issued under Title I of said Act and specifically but without limitation to the right of the President to cancel or modify his approval of any provision of this code or any conditions imposed by him upon his approval thereof.

2. Whenever the Administrator shall determine such action by him to be necessary to effectuate the policy of the Act, he may modify or cancel any action pursuant to this code by any agency established thereunder.

3. Except as to the provisions required by the Act, this code may be modified on the basis of experience or changes in circumstances, such modifications to be based upon application to the Administrator, on such notice and hearing as he shall specify and to become effective on approval by the President.

Article XVII—Monopolies

No provision of this code shall be so construed or applied as to permit or promote monopoly or monopolistic practices, or to eliminate, oppress, or discriminate against small enterprises.

Article XVIII—Effective Date

The effective date of the code shall be 10 days after approval thereof by the President.

Exhibit A

Districts

The 12 geographical districts as described by the United States Bureau of Mines are as follows:

No. 1—Eastern Pennsylvania, New Jersey, Maryland.
No. 2—New York, Maine.
No. 3—Western Pennsylvania, Ohio, West Virginia.
No. 4—Michigan.
No. 5—Wisconsin, Illinois, Indiana, Kentucky.
No. 6—Virginia, Tennessee, Alabama, Georgia, Florida, Louisiana.
No. 7—Eastern Missouri, Iowa, Minnesota, South Dakota.
No. 8—Western Missouri, Nebraska, Kansas, Oklahoma, Arkansas.
No. 9—Texas.
No. 10—Colorado, Montana, Utah, Wyoming, Idaho.
No. 11—California.
No. 12—Oregon, Washington.

Exhibit B

(Same as Exhibit C, p. 36 and 38, Pit and Quarry, November, 1933.)

Exhibit C

(Form of future-specific-sales contract)

[Front side]

Agreement made this ..... day of ..... 193.., between ..... Cement Company, hereinafter called Seller and ..... of ..... hereinafter called Buyer:

Seller hereby sells and agrees to furnish and deliver and Buyer hereby buys and agrees to receive and pay for Portland cement in the quantity and on the terms and conditions hereinafter and on the back hereof set forth.

Description and Quantity.—The purpose of this contract is to cover the purchase and sale of all the Portland cement required to complete the work hereinbefore described, whether more or less than the quantity stated herein.

Buyer represents that the aforesaid number of barrels of cement will be used in the construction of the above-described work and agrees that no portion of such cement will be used for any other purpose without the written consent of Seller. If any of the cement shipped hereunder is reconsigned or diverted by Buyer from the place of delivery specified herein or used for any other purpose, Seller may cancel this contract and refuse to ship any more cement and Buyer agrees to pay Seller's market price at the place of final destination for such cement as has been diverted by Buyer from the place of delivery specified herein or has been used by Buyer for any other purpose than the purpose above specified; Buyer remaining liable for all unpaid accounts.

Place of Delivery.—F.O.B.....

Time of Delivery.—Prior to..... as required by the progress of the work. Buyer shall give Seller shipping instructions in writing a reasonable time before shipments are to be made. If Buyer fails to order shipment within the time specified Seller shall have the right to extend the time for delivery of such cement, but shall not be obligated to do so except at its option.

Price.—

Per standard barrel, in cloth sacks..... $.....
Per standard barrel, in paper bags..... $.....
Per standard barrel, in bulk..... $.....

Price includes freight at present rates and will be increased by the amount of any increase in freight rate and/or any additional government tax on freight and/or by the amount of any tax on sales or contracts of sale effective during the life of this contract. All shipments made on this contract will be at the current destination price of Seller on the date of shipment, if this price is below the contract destination price mentioned herein.

Terms of Payment.—On approved credit net cash 30 days from

date of invoice, or 10 c. per bbl. discount for cash in 15 days from date of invoice.

If at any time the financial responsibility of Buyer becomes impaired or unsatisfactory to Seller, it reserves the right to require payments in advance or satisfactory security or guarantee that invoices will be promptly paid when due.

If buyer fails to comply with terms of payment, or with any of the other terms of sale, Seller reserves the right to cancel unfilled portion of this contract, without notice, Buyer remaining liable for all unpaid accounts. No waiver of such right shall be implied from any failure by Seller to exercise the same.

This contract is not assignable by Buyer without the consent of Seller in writing.

..... CEMENT COMPANY.

By..... By.....
(Buyer) (Seller)

[Reverse side]

Package.—Cloth sacks bearing Seller's brands, in which cement herein contracted for is packed, are the property of Seller and are for a period of 90 days from the delivery by Seller of the said cement, leased by it to Buyer at a charge of 10 c. each, which charge is included in price of cement packed in cloth sacks and which charge Buyer agrees to pay at same time and on same terms as payment for cement is made.

Buyer agrees within 90 days of delivery of the cement to deliver to Seller, the owner, at its nearest plant, freight charges collect, as provided by railroad classifications and tariffs, properly bundled and so marked as to insure complete identification, the cloth sacks bearing Seller's brands, in which the said cement is packed, and Seller agrees to refund to Buyer 10 c. for each said cloth sack so delivered in good condition subject to its count and inspection, and to assume freight charges thereon. If for any reason freight charges (per railroad tariffs) are prepaid, they will be refunded by Seller upon presentation of Railroad Company's receipted freight bill or bill of lading.

For useless cloth sacks which have been wet, no refund will be made. Cloth sacks bearing other than Seller's brands will be held by Seller for 30 days subject to Buyer's order.

In the event that any of the said empty cloth sacks bearing Seller's brands are sold or otherwise disposed of by Buyer to any person other than Seller, the owner, Buyer, agrees to pay Seller, as liquidated damages, 10 c. for each cloth sack so sold or disposed of.

If during the life of this contract, Seller shall change its present charge for the lease of cloth sacks, or the liquidated damages or both, it is expressly agreed that the said amount or amounts in the preceding paragraphs shall be changed accordingly, and the gross price specified herein for cement packed in cloth sacks shall be changed in accordance with the change in charge for lease of cloth sacks.

Price on cement packed in paper bags includes the paper bags, which are not returnable. Shipments in paper bags are made at Buyer's risk of breakage and resultant loss of cement.

(If cement company requires a deposit for cloth sacks, instead of leasing them, the following clauses are suggested):

Package.—The cloth sacks, bearing Seller's brand, containing the cement are not sold, but remain the property of Seller. Buyer agrees to return said cloth sacks, properly bundled and marked so as to insure complete identification, to Seller's nearest mill, within 90 days from the date of shipment of cement has been made.

Seller agrees to refund to Buyer the deposit of 10 c. for each cloth sack so returned. This deposit has been included in the price herein stated and Buyer agrees to include it when payment for the cement is made.

It is, however, expressly understood that such cloth sacks must be delivered to Seller's mill in good condition and will be subject to mill count and inspection, and that no refund will be made for useless cloth sacks nor for cloth sacks not of Seller's brand. Such cloth sacks, if received, will be held by Seller for 30 days subject to Buyer's order and risk.

Seller agrees to pay carrier's freight charges on returned empty cloth sacks of Seller's brand after delivery to its nearest mill or to refund Buyer for freight charges prepaid on such shipments upon presentation of original bill of lading properly executed or original receipted freight bill.

If Seller shall change its present deposit required for cloth sacks, it is expressly agreed that the said amounts in the preceding paragraphs shall be changed accordingly and the gross price specified herein for cement packed in cloth sacks shall be changed in accordance with the change of deposit required.

Price on cement packed in paper bags includes the paper bags which are not returnable. Shipments in paper bags are made at Buyer's risk of breakage and resultant loss of cement.

Claims.—Claims for loss or damage will not be considered unless supported by seal record and railroad agent's acknowledgement on freight bill. Freight overcharge claims must be accompanied by original receipted freight bill.

The Seller reserves the right to select the route and method by which shipments shall be forwarded, but no Seller can be required to favor any one route or method of transportation as against another by any joint action of the members of the industry or the Code Authority. Transportation charges per tariff applying from shipping point to place of delivery for route and method of shipment used, will be paid by the Buyer for the account of the Seller.

Specifications.—The cement shipped under this contract shall conform to the present standard specifications for Portland Cement of the American Society for Testing Materials and the American Standards Association and/or the Federal Specifications Board, and no other Warranty is made in respect thereof. Seller having no control over the use of cement will not, therefore, guarantee finished work in which it is used, nor shall the Seller be responsible for the condition of cement after delivery to Buyer. Any charges incident to inspection or tests made by or on behalf of Buyer to determine compliance with specifications shall be paid by Buyer.

Seller shall not be liable to Buyer for any delays in manufacturing, shipping, or delivering said cement, caused by fire, strikes, lockouts, differences with workmen, accidents, war, insurrection, inability to secure cars, coal, or other material, governmental interference or regulation, delays in transportation, or contingencies beyond Seller's control; and during the time of such delays Seller shall have the right to prorate among its various customers such cement as it may be able to manufacture and ship.

Seller shall have the right, but shall not be obligated, to ship from any plant other than the one normally supplying the delivery point specified herein.

Bulk cement.—Shipments of bulk cement shall be invoiced and collected for on a basis of track scale weights nearest to point of origin.

250-Pound Stones *(from page 65)*

by a 5-hp. General Electric motor through a Dayton Cog-Belt drive. The openings on the top deck of this machine vary from 7/8 in. to 7/16 in. and the lower deck always has 5/16-in. openings.

A supply of spare panels with various sizes of cloth is always kept ready and changes in the machines can very quickly be made to suit whatever specifications must be met. Many times a certain size material is made in the morning and the panels are changed during the noon hour and a different size of stone is made in the afternoon.

The chutes from all the decks of the two sizing screens are arranged so that any material can be returned to the third reduction crusher, or the material from the various chutes can be mixed and discharged into any bin according to the specification to be met. This is accomplished by means of flap gates in all the chutes.

When rebuilding his plant Mr. Hubbert concentrated on an arrangement flexible enough to allow him to make any stone to meet the various and ever-increasing number of specifications. He finds it profitable today to fill the smallest orders, even though they are of different specifications and require that special screen be put on the screens.

Another interesting feature is the fact that the screenings, or all the material which passes through the 5/16-in. openings on the lower deck of the 4-ft. by 8-ft. double-deck screen over the bins, is clean enough without being washed to be accepted for concrete sand in both private and City of Wilmington work. This is pure stone dust with absolutely no quarry dirt. Every ton of this material made is sold and it is seldom that any is in stock.

An average of about 6,000 tons of material of the various sizes is always carried in stock-piles in addition to the bin storage. This allows the company to accept any size order regardless of how many tons are required to be delivered on the job daily. The stone is put into storage by means of a 20-in. Stearns belt-conveyor which runs under the bin gates and discharges the stone within reach of a steam derrick which has a 1-cu.yd. Hayward clam-shell bucket on the end of its boom. This has a radius of 60 ft. and therefore can very easily put the various sizes of stone in their respective piles. This same derrick's boom and clam-shell bucket are then also used for reloading the material from the stock-piles into freight cars or trucks for shipment. The conveyor has Boston belting.

There are 4 steam derricks and each has a boom that will reach a radius of 60 ft. Two of these derricks are in the quarry and are used to load the extra-large rip-rap pieces of which will weigh up to 20,000 lb. The other two derricks are used in the storage-piles, one handling the skips which take the stone from the big scalper, and the other handling the crushed stock-piled material.

An Ingersoll-Rand Imperial compressor delivers about 886 cu.ft. of free air per min. and is driven by a 225-hp. synchronous motor. The entire plant is electrified, except the shovel and the steam derricks. A total of about 630 hp. is used.

Renewed Optimism Prevailed at Cement Manufacturers' Chicago Meeting

Association's Studies Point to New Uses, New Methods, and New Marketing Plans

WITH greater optimism than has pervaded the cement industry for several years and with an attendance exceeding that of its recent similar affairs, the thirty-first annual meeting of the Portland Cement Assn. was held at the Blackstone, in Chicago, recently.

The occasion was forward-looking in every particular, and no section of the country or phase of the association's diversified field of activities seemed to have been overlooked, judging by attendance and program features. Technical and other committee sessions on Monday, Nov. 20, covered the range of current research and study in the field of cement manufacture and problems bearing on cement sacks and transportation. Tuesday's sessions, sponsored by the Committee on Promotion, were the high point of the meeting with a program featuring new uses, new methods, and new plans for expanding markets. The third day of the meeting was given over to a formal business session and a trip of inspection to the Baha'i Temple, a remarkable concrete religious edifice at Wilmette, Ill.

Although cement has suffered staggering losses along with all other units of the nonmetallic-mineral industries, here was a meeting in which the depression was not mentioned and apparently was not thought of. Discussions were concentrated on the absorbing problem of providing adequate markets, even granting, as an association spokesman frankly put it, that the period of deflation might be as long as that which followed the Civil War—possibly 30 years!

Promotion.—The subjects on the morning promotion program included *"Evaluation of Architectural Concrete,* an illustrated discussion of the use of concrete in the classical structures of ancient times and of the present, by Paul C. Van Zandt, vice-president, Universal Atlas Cement Co.; *Exploring Concrete's Unknown Beauty,* an exposition of the architects' and sculptors' love for concrete, illustrated with a collection of colored concrete building panels by John J. Earley, architectural sculptor, Washington, D. C.; *Our Plan to Sell Architectural Concrete,* by A. J. Boase of the association staff; *How Can We Keep Industrially Young?,* by President E. J. Mehren of the association; *"A Concrete Road for Every Load",* by Frank T. Sheets, the association's consulting engineer; and *Fireproof Floors for Low-Cost Homes,* by E. W. Dienhart also of the association staff.

Road Design.—How motorists will get more in return for their road revenues through an economy plan of building concrete pavement designed to meet specific traffic conditions was set forth in interesting detail in Frank T. Sheets' paper, *A Concrete Road for Every Load.* Mr. Sheets said in part:

"No highway engineer would think of building for ordinary highway service a bridge capable of carrying the heaviest railroad loadings, nor would highway loadings be a proper criterion for a railway-bridge design.

"A pavement slab is an engineering structure. It is capable of almost as exact analysis, as bridges and other structures. Yet we commonly see pavement cross-sections suitable for the heaviest primary road traffic used indiscriminately on roads of medium or light traffic. We also see inadequate designs subjected to heavy-duty service. This is a wasteful and unscientific practice.

"Therefore, the first logical and essential step in highway design is to determine the loads which the pavement will reasonably be called upon to carry.

Edward J. Mehren.

George F. Coffin.

B. F. Affleck.

Frank T. Sheets.

Clinker-Cooler Installation Cuts Coal Consumption Fifteen Per Cent.

Comparison of B. T. U. Values of Fuels Shows Still Greater Economy

By FRANK MOYLE
Gen. Supt., Marquette Cement Mfg. Co.

THE first Lee process clinker cooler unit installed at the La Salle, Ill., plant of the Marquette Cement Mfg. Co. went into operation during November, 1931. After a period of service, during which time tests were made, 10 additional coolers were purchased and installed, 7 of these units for the La Salle plant and 3 for the Cape Girardeau, Mo., plant. These installations were completed during the first part of 1932. All the installations are practically identical, and therefore the data contained in this article, taken from the La Salle installation, will be typical of all.

The La Salle plant has 8 kilns, 8½ ft. in diameter and 100 ft. long, lined with standard 6-in. kiln blocks. The kilns discharge their gases into waste-heat boilers equipped with air seals at the feed ends. The kilns are driven by direct-current motors, providing a speed variation of from 20 to 70 r.p.hr.

In order to provide room for the coolers, it was necessary to excavate beneath the kilns and mount the discharge-end trunnion rolls on steel A-frames. This arrangement provides a counter flow of the clinker through the coolers, which were installed under the kilns. At the time of the installation of the coolers, all the kilns were provided with new hoods and 4 kilns with new ends, in order that maximum burning efficiency could be obtained.

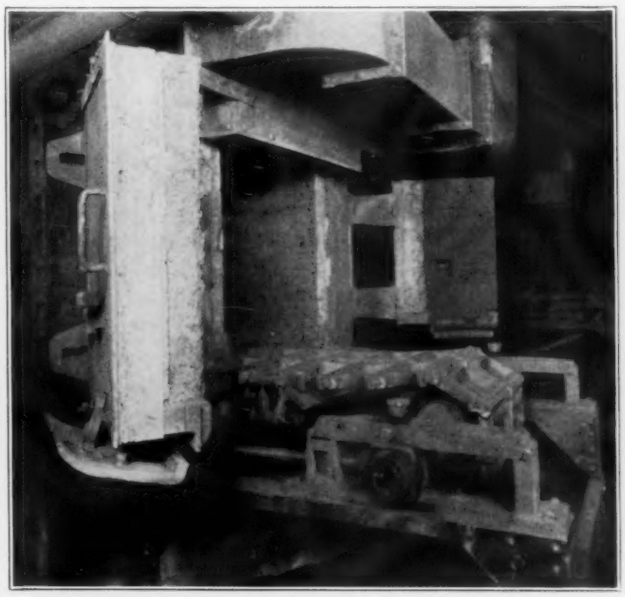
The clinker from the kilns is discharged directly into the preliminary chambers of the coolers through bifurcated spouts. Slides and dampers are provided to by-pass the coolers, if for any reason it should be necessary to do so, and to allow cooler inspection without discontinuing operation of the kilns.

The average temperature of the clinker entering the coolers is approximately 1,950 deg. F. This temperature was not obtained with shielded thermocouple pyrometers and consequently some inaccuracy is present in the reading. With the atmospheric temperature at 70 deg. F., clinker leaving the coolers may be held in the hand, with the exception of occasional large lumps.

The fan supplying the air to the coolers consumes 55 hp. and delivers approximately 29,000 cu.ft. per min. Each cooler is equipped with a 5-hp. variable-speed motor which drives the conveying chains, and which is interlocked with the kiln-speed controller so that the speed of the cooler chains is synchronized with the kiln speed to facilitate obtaining an even thickness of clinker over the grates at all kiln speeds. Actually 2.75 hp. is required to drive each conveyor.

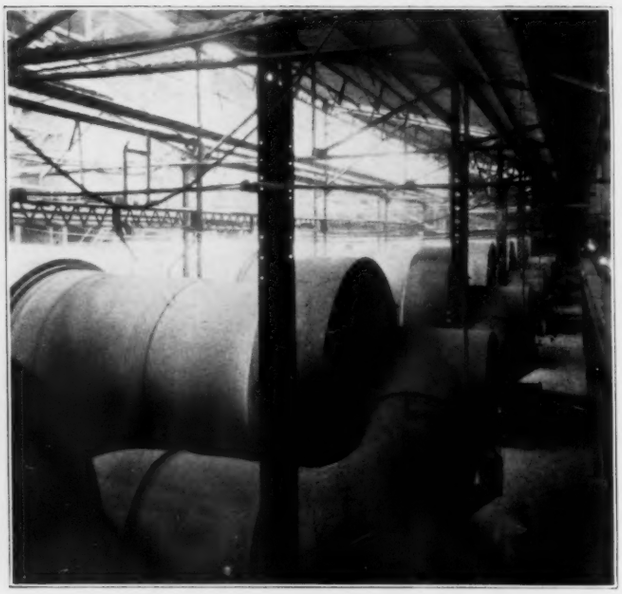
The volume of air passing through the preliminary chamber of the coolers, and used as secondary air to the kiln, is approximately 14,500 cu.ft. per min. at an average temperature of 975 deg. F.

The preliminary air going to the kiln is taken from a chamber on the coolers between the cooler



Feed end of one of eight coolers at La Salle, Ill., plant of Marquette Cement Mfg. Co.

Interior of cooler showing condition after more than a year's continuous operation.



Some of the eight kilns equipped with coolers at the La Salle plant.

lining and the external shell. The volume of this air is approximately 3,500 cu.ft. per min. at an average temperature of 225 deg. F. The remainder of the air required for combustion is furnished by hood leakage, which is necessary at this plant to protect the end of the kilns.

The waste air, approximately 15,000 cu.ft. per min. at an average temperature of 262 deg. F., is not utilized. Any clinker dust contained in this air is precipitated by the use of a baffled settling chamber ahead of the vent stack, and dust losses are negligible.

The fuel consumption expressed in pounds per barrel, during an average month's run since the installation of the coolers, is 85 per cent. of the consumption prior thereto, notwithstanding the fact that the coal used to-day has an average calorific value of 11,937 B.t.u. per lb. as against 12,127 B.t.u. per lb. in the coal used prior to this installation. The actual fuel saving in B.t.u. is therefore somewhat more than 15 per cent.

The gas analyses indicate nearly perfect combustion at all times. The CO_2 content averages from 26.8 per cent. to 32 per cent. The O_2 from 0 to .4 of 1 per cent., and the CO from 0 to .6 of 1 per cent.

The maintenance cost of these coolers is especially low. The last inspection showed practically no undue wear on any of the working parts. Practically no changes have been made in these units since their installation with the exception of minor adjustments at the beginning of operation.

The hot zones of the coolers are lined with carborundum brick and refractories of the suspended-wall type. The grate bars in the preliminary or hot zones, burner-pipe jacket, support and other parts subject to intense heat, including the first and second swinging gates, are made of a special chrome-nickel steel. The secondary, or cooling zones are lined with special hard-iron Cementite castings.

The clinker discharged from these coolers is of such structure that it results in easier grinding and much less wear on the grinding units, especially the media used in tube-mills. Tests show approximately 16 per cent. better grindability on clinker cooled with the Lee process clinker cooler as compared with clinker cooled in the usual manner, and the processed clinker is less solid and homogeneous than the normally-cooled clinker. It would, therefore, appear from a study of the two types of clinker that the unequal contraction of the constituents when cooled rapidly by the Lee process would be likely to introduce stresses in the material, or possibly microscopic cracks, that would increase the ease of grinding.

Cement Meeting *(from page 72)*

Accident-Prevention Committee.—An important outcome of the committee work of the meeting was the decision by the Committee on Accident Prevention and Insurance to proceed with the planning of a comprehensive new campaign against mill and quarry accidents to start Jan. 1. Supplementary to the new safety drive, Chairman J. B. John has appointed a sub-committee of five well-known leaders in cement safety work to devise and submit new features for general and local plant campaigns and has designated a new safety flag of the association to be ready for display on plant flag-poles with the start of the new year.

The committee also voted to continue the annual trophy contest during 1934, concentrating on mills which have never won this award and to hold a larger program of regional safety meetings next year than during 1933.

New Officers.—At the business session on Nov. 22 George F. Coffin, treasurer and general manager of the Nazareth Cement Co., Nazareth, Pa., was elected chairman of the Board of Directors of the association, and Benjamin F. Affleck, president of the Universal Atlas Cement Co., Chicago, was elected treasurer.

Newly-elected members of the Board of Directors are: W. A. Davis, vice-president, Standard Portland Cement Co., Cleveland; J. Ross Hanahan, president, Volunteer Portland Cement Co., Charleston, S. C.; J. B. John, president, Medusa Portland Cement Co., Cleveland; A. P. Meyer, vice-president, Green Bag Cement Co. of Pennsylvania, Pittsburgh; M. C. Monday, president, Hermitage Portland Cement Co., Knoxville; A. J. Rooney, vice-president and sales manager, Huron Portland Cement Co., Detroit; Blaine S. Smith, president, Pennsylvania-Dixie Cement Corp., New York; S. W. Storey, vice-president, Trinity Portland Cement Co., Chicago; and E. P. Lucas, president, Superior Portland Cement, Inc., Seattle.

The directors reëlected Edward J. Mehren president and William M. Kinney, vice-president, secretary and general manager.

View of Route 6 near Dixon, Ill., resurfaced with aggregate treated with bitumen by the Sealdrok process.

Mineral Aggregate for Road Resurfacing Prepared by New Type of Plant

Continuous Process Produces 40 Tons an Hour With Labor of But Three Men

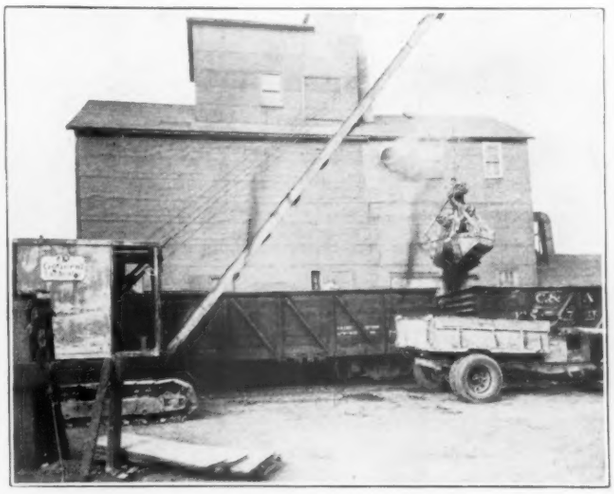
AGGREGATES producers who have been considering the possibilities of adding to their production facilities means for bituminizing their products will be interested in information regarding the production of Sealdrok Cold-lay asphalt paving mixture such as was used to resurface an old brick highway on Route 6 near Dixon, Ill., for the Illinois State Highway Dept. As approximately 94 per cent. of all asphalt paving mixtures is the mineral aggregate which carries the stresses of traffic and of climatic changes, the life of pavements made of such mixtures may be said to depend almost entirely on the quality of the aggregate and its proper preparation.

In the Sealdrok process the aggregate is first thoroughly dried and graded as to size. It is then impregnated with a waterproofing compound having an asphaltic base, so that each piece of the aggregate is sealed with a film of pure bitumen. Finally a coating of Texaco asphalt cement of 60 to 70 penetration is applied.

It is well established that asphalt will not properly adhere to the aggregate unless the moisture is first completely removed. Asphalt pavement prepared with a wet aggregate is subjected to all the ravages of water and frost action, the most destructive elements in all types of pavement. Hence, the necessity for driving off all the moisture present in the aggregate.

The plant used for preparing aggregate in this manner is of the continuous-mixing type and is completely automatic. It is set to predetermined

The plant used for impregnating mineral aggregate with asphaltic compound.



Unloading coated aggregate after 8 days' storage in open-top cars.

capacities from 20 tons an hr. up to as high as 40 tons an hr. All the materials are accurately measured and controlled, so that every ton of mixture produced is uniform. The drier arrangement, whereby the mineral aggregate is dried and cooled in one chamber, eliminates any danger of the hot aggregate destroying the cementing value of the asphalt. It requires 3 min. for the mixture to pass through the mixer, thereby insuring a thorough intermingling and coating of the mineral aggregate with the asphalt cement. The plant requires but 3 laborers for its operation, an economical feature that makes possible worthwhile savings in production costs.

The Sealdrok process further provides that the mineral aggregate, after being thoroughly dried and properly graded to meet particular specifications and impregnated with the waterproofing compound, may be shipped as such and stock-piled for future use. The asphalt coating may be applied with inexpensive equipment, such as a concrete mixer, by hand, or by the penetration method, and yet produce a high-type asphalt surface, as the important work has been done in scientifically preparing the mineral aggregate.

The average contractor does not have adequate equipment or skilled labor for the proper conditioning of aggregate on the job. Contractors are now able to buy these materials all ready-conditioned from the quarries and gravel pits operating mixing plants.

Waterproofed mineral aggregate provides an economical material for building and widening road shoulders. It provides a dustless and waterproof shoulder and prevents water from running underneath the concrete slab. It will remain permanently in place.

The process described also covers the treatment of stone dust and screenings, which are often waste products at quarries. This treated material may

Illustrating the degree of impregnation attained by the process.

be stored in convenient stock-piles for future use and may be utilized for covering macadam roadways and streets in place of oil, for the covering of parking areas to prevent dust, under sidewalks in place of cinders, and for many other uses. Sand may be treated and used for the same purposes. Material treated by this method may be shipped to

The aggregate treated by the process described is laid cold.

any distance in open-top cars or trucks and handled with ease, as indicated in one of the accompanying views showing this material being unloaded with a clam-shell bucket after having been in the car eight days.

This process and equipment were developed by the American Sealdrok Corp., Chicago, Ill. This company is a subsidiary of the American Asphalt Paint Co.

Profits by "Repeal" *(from page 34)*

fied in his order. He then starts the various aggregate and cement feeders and the automatic water-valve by push-button. As soon as each feeder has discharged the desired amount it is instantly stopped by the "electric eye." With both hoppers filled and ready, the batch is dumped manually by conveniently-located hand-wheels into a waiting truck-mixer below. By discharging both hoppers at once a certain amount of preliminary mixing is accomplished.

Looking back over the past summer, we find that Lake Erie concrete has become well established in Peoria. The 3-unit washing-and-screening, storage, and concrete-batching plant is located in the heart of the city where hardly a person can miss seeing it. The entire plant can be operated at capacity by 4 men, who at the same time handle the normal maintenance and repair work. Concrete to meet practically any specification can be batched quickly and accurately. Operating costs are easily figured and, it is said, can be kept low enough to justify centrally-mixed concrete for practically any job.

The officers of the Lake Erie Mining Co. are: James F. McElwee, president; W. C. Gill, treasurer and general manager; B. C. Locke, chief engineer.

MEN OF THE INDUSTRY

CHARLES L. HOGAN

CHARLES L. HOGAN, newly-elected president and general manager of the International Cement Corp. and a member of the board of directors and the executive committee, was born in Ohio in 1880. After some years of railroad work he became traffic manager of the Lumbermen's Portland Cement Co. in 1910 and later secretary and sales manager. In 1914 he became president and manager of the Altoona Cement Co., in 1921 manager of the Cuban Portland Cement Co., an International subsidiary, and in 1924 vice-president and manager of International's New York subsidiary, now the Lone Star Cement Co., New York. In 1926 he became vice-president of the International Cement Corp., and in 1928 senior vice-president. Mr. Hogan is a member of the board of directors of the Portland Cement Assn.

Personal Mention

Joseph E. Otis, Jr., was recently elected president of the Stewart-Warner Corp. and **T. T. Sullivan** was elected acting treasurer. Mr. Otis had been executive vice president of the company and has been connected with the Alemite Co., a subsidiary since 1921.

James K. Richardson, safety engineer for the United States Potash Co., Carlsbad, N. M., has been given leave of absence for 3 months to accept a position as safety inspector for civil works projects in the state.

W. L. Kaiser of the Peerless Cement Corp., Detroit, Mich., has been elected chairman of the Downriver Safety Group executive committee, a division of the Detroit Industrial Safety Council.

D. J. Borneman, who has been sales representative for the Springfield Sand & Gravel Co. for the past 10 years, has accepted a sales position with the Kingston Lake Gravel Co., Mapleton, Ill.

C. S. McArdle, sales manager of the Universal Atlas Cement Co., Birmingham, Ala., for the past 2 years, has been transferred to Kansas City, Mo., where he will have charge of the company's offices. **Fred T. Wiggins,** former chief clerk in the Birmingham office succeeds Mr. McArdle as sales manager there.

W. A. Nugent, formerly district manager of the Chicago territory for the Independent Pneumatic Tool Co., Chicago, Ill., has been appointed sales manager in charge of all pneumatic and electric tool sales.

F. W. Young, formerly with Filtration Engineers, Inc., and more recently with the Pulp Filter Co., has joined the sales organization of Oliver United Filters, Inc., New York, Chicago and San Francisco.

George L. Bell has resigned his position as vice president in charge of sales for the Caterpillar Tractor Co., Peoria, Ill., to become executive director of the Men's Clothing Manufacturing Industry. In this position he will have full power to enforce all of the trade practice provisions of the code of that industry.

S. M. D. Clapper has been elected president of the General Refractories Co., succeeding John R. Sproul, resigned, who is now assistant to the president. Mr. Clapper had been chairman of the board, and this position is now vacant.

Obituary

Willoughby E. Snyder, 58, former chief chemist at local cement plants, died Dec. 14 at his home in Allentown, Pa. After retiring from the cement industry in 1912, Mr. Snyder became associated with the crushed stone industry. Recently, with his sons, he perfected a newly-patented cement-manufacturing process.

Clifford F. Messinger, 44, president of the Chain Belt Co., Milwaukee, Wis., and a civic leader of that city, died at his home in that city recently of a heart attack.

Everett B. Irwin, 58, secretary of the Woodville Lime Products Co., Toledo, O., died in a hospital in that city recently following an operation.

William R. Berry, 69, secretary and treasurer of the Santa Cruz Portland Cement Co., for more than 20 years, died recently at his home in San Francisco, Cal., following an illness of several months.

Edward E. Bender, 45, shipping superintendent at the plant of the Universal Atlas Cement Co., Northampton, Pa., died recently in that city following an operation.

▼ *Coming Events* ▲

January 21, 1934, Cincinnati, O.—Annual meeting of directors of national crushed stone, sand and gravel, and slag associations. Netherland Plaza Hotel.

January 22, 1934, Cincinnati, O.—First organizing meeting of mineral - aggregates industries code authority. Netherland Plaza Hotel.

January 22-25, 1934, Chicago, Ill. — Annual convention and show, American Road Builders' Assn., Stevens Hotel, Chicago, Ill.

January 23-26, 1934, Cincinnati, O.—Independent conventions of National Sand & Gravel Assn., National Cr. St. Assn., and National Slag Assn. with some joint sessions. Netherland Plaza Hotel.

Fred C. Sheldon, 63, head of the Sheldon Slate Products Co., Granville, N. Y., and a pioneer in the slate industry in that section, died on Jan. 3 at his home in that city.

Thomas Bolger, 77, well-known slate operator and member of the firm of Bolger & Heller Co., died Dec. 25 at his home in Bangor, Pa.

Joseph S. Oechsle, 39, a consulting engineer of the Worthington Pump & Machy. Corp., died on Dec. 24 at a hospital in Philadelphia, Pa.

Harvey L. Lillie, 37, proprietor of the Lillie Coal Co. and a sand and gravel plant operator, died suddenly Dec. 22 of heart failure at his home in Dubuque, Ia.

Arthur A. Brown, 60, assistant vice president in charge of sales for the Westinghouse Electric & Mfg. Co., died Dec. 19 at his home in Mt. Vernon, N. Y.

Harold R. Sanson, 57, president of the Southern Cement Co., Birmingham, Ala., died on Dec. 30 after a brief illness.

New Incorporations

MACON COUNTY LIMEROCK CO., Montezuma, Ga. Capital $25,000. J. B. Easterlin, Jr., O. T. Harden and C. H. Wheatley.

AMERICAN CEMENT CORP., Hartford, Conn. Capital $50,000. $100 par value. Jacob Lifset, Harry Levine and Charles J. Sheketoff.

MIAMI STONE CO., Toledo, O. 1,000 shares n.p.v. R. H. Rogers, A. C. Ehrenfried and C. V. Wolfe.

COLUMBIA MINING PRODUCTS CO., Walla Walla, Wash. Capital $100,000. James O. Howton, manager.

TITAN GYPSUM CO., New York, N. Y. 50 shares pfd. and 100 shares com., n.p.v. Harold W. Hayman, Selig Birenbach and Louis C. Hoyt, all of 100 Williams St., New York, N. Y.

WOLF SAND & GRAVEL CO., INC., Morse Bluff, Nebr. Capital $25,000. S. B. Wolf, Emil B. Wolf, and A. D. Wolf.

SEMINOLE ROCK & SAND CO., Miami, Fla. 100 shares @ $100 par value; 100 shares n.p.v. J. L. Booth, H. B. St. Lawrence and L. P. Barber.

DEALERS LIME CORP., New York, N. Y. Abr. A. Silberberg, 285 Madison Ave.

NATIONAL VERMICULITE PRODUCTS CORP., 316 S LaSalle St., Chicago, Ill. 20,000 shares n.p.v. Donald A. Sells, W. J. Mohr and A. T. Kearney. John H. Bishop, Board of Trade Bldg., correspondent.

Aggregates Statistics

By H. H. HUGHES and K. G. WARNER

Bureau of Mines, Department of Commerce

OPTIMISTIC trends in the indicators of markets for construction materials were noted in the third quarter of 1933, but actual consumption continued to maintain a level far below that of 1932. The deluge of contracts resulting from public-works allotments had not yet been reflected in demands for materials, but available evidence suggests that the fourth quarter results will provide some relief for the aggregates industries.

The most distressing figures in Table I are those for concrete-pavement contract awards, which for nine months of 1933 amounted to only about one-third of those of 1932. Even for the third quarter, awards in 1933 were 60.8 per cent. below the previous year's. Fortunately, some improvement was shown in October and November, and with the aid of public-works allotments the outlook for highway construction in 1934 is considerably brighter. The building situation is not quite as bad. Contracts awarded in the third quarter of 1933 were only 20.2 per cent. behind the record of 1932, and figures for October and November indicate that the fourth quarter of 1933 was appreciably better than that of the previous year. Total construction contracts awarded in 1933, as reported by the F. W. Dodge Corp., probably were about 15 per cent. below those of 1932. Residential contracts for nine months of 1933 compared more favorably with those of 1932 than other types of construction. This was due, however, to the fact that residential building in 1932 dropped to a lower level comparatively than nonresidential, rather than to any spurt in new residential building. The encouraging increases in F. W. Dodge figures for the last few months of 1933 were due entirely to an increase in publicly-financed construction, for residential contracts virtually stood still throughout the latter half of the year.

Table I—SUMMARY OF MOVEMENTS OF AGGREGATE MATERIALS AND INDICATORS OF THEIR MARKETS IN THE THIRD QUARTER OF 1933

	Third Quarter			Calendar Year to September 30		
	1932 July-Sept.	1933 [1] July-Sept.	Change From 1932 (*per cent*)	1932	1933 [1]	Change From 1932 (*per cent*)
Railway shipments, Class I roads [2] (excludes non-revenue railroad ballast)						
Sand and gravel [3] *short tons*	10,244,752	7,103,686	−30.7%	21,767,533	15,969,065	−26.6%
Crushed stone [4] *short tons*	5,619,874	3,872,221	−31.1	11,543,857	9,037,333	−21.7
Furnace slag *short tons*	611,214	648,205	+ 6.1	1,612,705	1,519,094	− 5.8
Water shipments, Pittsburgh district [5]						
Sand and gravel *short tons*	410,980	618,300	+50.4	974,724	1,170,772	+20.1
Total aggregates accounted for *short tons*	16,886,820	12,242,412	−27.5	35,898,819	27,696,264	−22.8
General business activity						
Portland cement shipments [6] *bbl*	29,915,000	21,208,000	−29.1	64,219,000	49,135,000	−23.5
Indicated domestic demand, petroleum and lake asphalt [7] *short tons*	798,008	712,256	−10.7	1,769,031	1,578,818	−10.8
Index of industrial production [8] *index numbers*	61	90	+47.5	64	77	+20.3
Highway construction, concrete pavement contract awards [9]						
Total, monthly avg. *sq. yds.*	32,164,000	12,842,000	−60.1	76,464,000	25,698,000	−66.4
Roads only, monthly average *sq. yds.*	28,057,000	11,005,000	−60.8	68,496,000	22,451,000	−67.2
Building construction contract awards						
Total value, monthly average [10]	$390,284,000	$311,440,000	−20.2	$1,057,364,000	$744,192,000	−29.6
Residential, floor space, monthly avg. [10] *sq. ft.*	17,551,000	20,562,000	+17.2	58,697,000	54,119,000	− 7.8
Engineering construction, value, monthly avg. [11]	$316,579,000	$231,108,000	−27.0	$914,694,000	$677,738,000	−25.9

[1] Figures may be subject to revision. [2] Interstate Commerce Commission. [3] Excludes glass and molding sand. [4] Excludes fluxing stone. [5] Chief Statistician, Board of Engineers for Rivers and Harbors. [6] B. W. Bagley, U. S. Bureau of Mines. [7] A. H. Redfield, U. S. Bureau of Mines. [8] Federal Reserve Board, 1923-1925 average = 100. [9] Portland Cement Assn. [10] F. W. Dodge Corp. [11] *Engineering News-Record.*

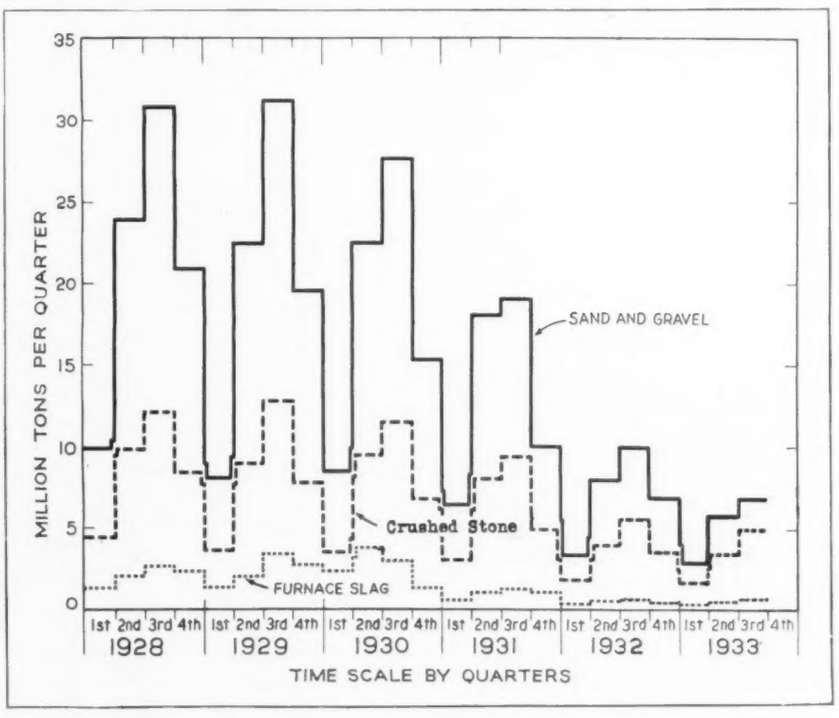


Fig. 1. Quarterly trends in railway movement of aggregates as indicated by revenue shipments of sand and gravel, crushed stone (not including fluxing stone) and furnace slag.

Industrial Production Index Rises.—The stagnation in the construction industry is in striking contrast to the trend of the index of industrial production, which averaged 90 for the third quarter of 1933 as against 61 for the third quarter of 1932. For nine months of 1933 the index averaged 13 points higher than the same period of 1932, having increased 20 3 per cent. from 64 to 77.

Asphalt Holds Up Better Than Cement.—Secondary-road construction apparently was maintained during 1933 at a higher level than concrete paving, for the indicated domestic demand for asphalt dropped only 10.8 per cent. for three-quarters of 1933 in comparison with the corresponding period of 1932, whereas cement dropped 23.5 per cent.

Aggregates Shipments Low.—The low levels in paving and building construction were reflected in declines in the shipments of aggregates. Railway

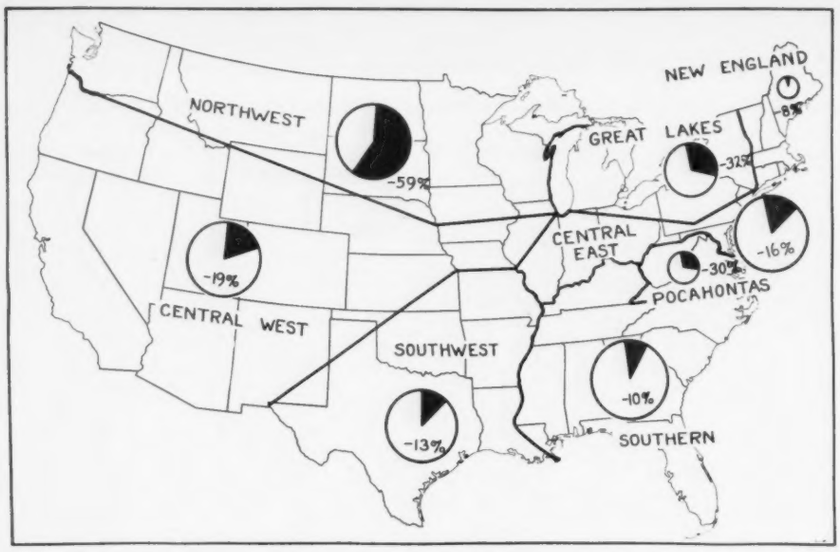


Fig. 2. Railway shipments of aggregates for first 9 months of 1932 and 1933 by regions. Total area of each circle represents 1932 shipments and the black sector shows the percentage of decrease for the corresponding period of 1933.

shipments of sand and gravel on Class I railroads dropped 26.4 per cent. to Sept. 30, 1933, in comparison with those for the same portion of 1932. Crushed-stone shipments declined 21.7 per cent., but slag only 5.8 per cent. Barge shipments of sand and gravel in the Pittsburgh district provided the most encouraging feature in the aggregates industry during 1933. For the third quarter the tonnage moved by water on the Ohio and Allegheny Rivers was 50.4 per cent. greater than during the same quarter 1932. Shipments for the nine months were 20.1 per cent higher. The total aggregates accounted for in the survey, however, were 22.8 per cent. below 1932 for the first nine months of the respective years. This checks closely the decline of 23.5 per cent. in cement shipments.

Fig. 1 shows the quarterly trends in railway shipments of aggregates.

Decline Varies with Region.—A summary of the railway movements of aggregates by Interstate Commerce Commission regions is given in Table II and is shown graphically in Fig. 2. All the regions experienced appreciable declines in aggregates shipments during the third quarter of 1933 as compared with the same period of 1932. The drop varied, however, from only 9.2 per cent. in the central eastern region to 60.6 per cent. in the northwestern.

Shipments during the first nine months of 1933 compared with those of the same period of 1932 show similar variations. The New England region, with a decline of only 7.7 per cent. and the southern, with 9.7 per cent., held up best, while the northwestern region continued to show the greatest drop, 57.8 per cent.

Outlook for 1934 Brighter.—With about $3,000,000,000 allotted by the Public Works Administration by the end of 1933, and contracts awarded for almost one-third of the construction, the outlook for the aggregates industries in 1934 seems bright in comparison with that of 1933.

Table II—SUMMARY OF RAIL SHIPMENTS OF AGGREGATES IN THE THIRD QUARTER OF 1933, BY REGIONS (*Short Tons*) *A*

Regions	Third Quarter			Calendar Year to September 30		
	1932 July-Sept.	1933 *b* July-Sept.	Change From 1932 (*per cent*)	1932	1933 *b*	Change From 1932 (*per cent*)
New England:						
Sand and gravel	45,736	68,570	+49.9	85,031	108,743	+27.9
Crushed Stone	244,193	165,936	−32.0	416,807	354,321	−15.0
Furnace slag	87	26	−70.1	87	26	−70.1
Total	290,016	234,532	−19.1	501,925	463,090	− 7.7
Great Lakes:						
Sand and gravel	1,165,833	863,280	−26.0	2,146,990	1,576,824	−26.6
Crushed stone	1,012,623	656,308	−35.2	1,734,179	1,099,112	−36.6
Furnace slag	165,713	87,630	−47.1	405,840	235,974	−41.9
Total	2,344,169	1,607,218	−31.4	4,287,009	2,911,910	−32.1
Central Eastern:						
Sand and gravel	1,328,499	1,170,818	−11.9	2,795,652	2,186,857	−21.8
Crushed stone	1,198,378	955,018	−20.3	2,294,244	1,913,494	−16.6
Furnace slag	300,918	443,195	+47.3	848,136	894,938	+ 5.5
Total	2,827,795	2,569,031	− 9.2	5,938,032	4,995,289	−15.9
Pocahontas:						
Sand and gravel	324,362	130,912	−59.6	714,046	423,086	−40.7
Crushed stone	129,269	110,496	−14.5	305,634	302,687	− 1.0
Furnace slag	46,513	21,799	−53.1	70,947	41,390	−41.7
Total	500,144	263,207	−47.4	1,090,627	767,163	−29.7
Southern:						
Sand and gravel	1,185,948	935,987	−21.1	3,488,120	3,100,023	−11.1
Crushed stone	1,215,920	885,349	−27.2	2,673,399	2,386,584	−10.7
Furnace slag	93,173	89,934	− 3.5	272,221	321,707	+18.2
Total	2,495,041	1,911,270	−23.4	6,433,740	5,808,314	− 9.7
Northwestern:						
Sand and gravel	2,802,315	1,192,502	−57.4	4,590,557	2,011,239	−56.2
Crushed stone	642,919	163,492	−74.6	1,143,709	356,124	−68.9
Furnace slag	435	443	+ 1.8	1,707	1,078	−36.8
Total	3,445,669	1,356,437	−60.6	5,735,973	2,368,441	−58.7
Central Western:						
Sand and gravel	1,942,560	1,754,622	− 9.7	4,331,738	3,438,470	−20.6
Crushed stone	591,156	409,006	−30.8	1,366,482	1,188,668	−13.0
Furnace slag	50	28	−44.0	309	493	+59.5
Total	2,533,766	2,163,656	−14.6	5,698,529	4,627,631	−18.8
Southwestern:						
Sand and gravel	1,449,499	986,995	−31.9	3,615,396	3,123,783	−13.6
Crushed stone	585,416	526,616	−10.0	1,609,403	1,437,363	−10.7
Furnace slag	4,325	5,150	+19.1	13,458	24,259	+80.3
Total	2,039,240	1,518,761	−25.5	5,238,257	4,585,405	−12.5

a Compiled from reports of the Interstate Commerce Commission. *b* Figures for 1933 are subject to revision.

Asphalt Paint Forms Paving Plant Company

A new unit known as the American Sealdrok Corp. has just been incorporated, as a subsidiary of the American Asphalt Paint Co., 43 E. Ohio St., Chicago, Ill. The foundation of the new company is the research work and patented process of H. M. Stafford who for 13 years was divisional director of the Barber Asphalt Co. for the western territory and introduced Amiesite with headquarters in Chicago in 1924.

The outstanding feature of the process is the treatment of the mineral aggregate which, according to Mr. Stafford, is impregnated with an asphalt solution making the aggregate waterproof and impervious to the effect of moisture. The new company has been completely financed by Grover M. Hermann, president of the American Asphalt Paint Co., and will operate as a subsidiary of the parent company.

H. M. Stafford is president, T. C. Ford is vice president, Grover M. Hermann is treasurer, and R. L. Oughton, secretary. Mr. Ford and Mr. Oughton are also officers of American Asphalt Paint Co.

The Productive Equipment Co., Chicago, Ill., has moved to larger quarters at 210 E. Ohio St., due to increased demand for its Jigger vibrating screens.

Latest Portland-Cement Statistics

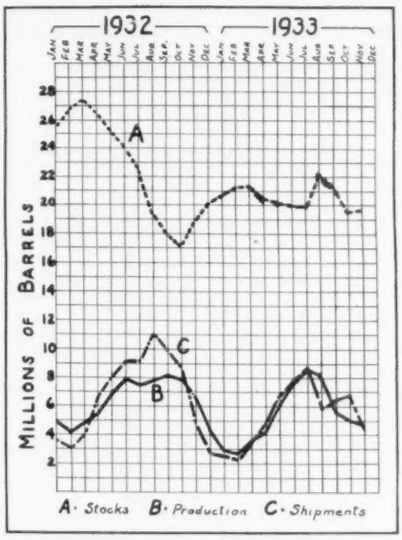


Chart showing monthly production, shipments and stocks on hand at end of month from January, 1932, to November, 1933.

THE Portland-cement industry in November, 1933, produced 4,672,000 bbl., shipped 4,463,000 bbl. from the mills, and had in stock at the end of the month 19,711,000 bbl. Production of Portland cement in November, 1933, showed a decrease of 27.7 per cent. and shipments a decrease of 6.7 per cent., as compared with November, 1932. Cement stocks at mills were 4.9 per cent. higher than a year ago.

The statistics here given are compiled from reports for November, received by the Bureau of Mines, from all manufacturing plants except two, for which estimates have been included in lieu of actual returns.

In the following statement the total output of finished cement is compared with the estimated capacity of 163 plants at the close of November, 1933, and of 165 plants at the close of November, 1932.

RATIO (*per cent.*) OF PRODUCTION TO CAPACITY

	November		Oct.	Sept.	August
	1932	1933	1933	1933	1933
The month	29.1	21.2	22.1	25.5	35.9
The 12 months ended	29.0	23.9	24.5	25.5	26.5

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1932 AND 1933 (*In thousands of barrels*)

Month	Production		Shipments		Stocks At End of Month	
	1932	1933	1932	1933	1932	1933
January	5,026	2,958	3,393	2,502	25,778	20,624
February	3,971	2,777	3,118	2,278	26,657	21,125
March	4,847	3,684	3,973	3,510	27,545	21,298
April	5,478	4,183	6,536	4,949	26,496	20,542
May	6,913	6,262	8,020	6,709	25,394	20,117
June	7,921	7,804	9,264	7,979	24,043	19,936
July	7,659	8,609	9,218	8,697	22,512	19,848
August	7,835	8,223	10,968	5,994	19,398	22,078
September	8,210	5,638	9,729	6,517	17,878	21,216
October	7,939	5,037	8,743	6,750	17,084	*a*19,502
November	6,462	4,672	4,782	4,463	18,788	19,711
December	4,248	.....	2,835	.....	20,205	.....
Totals	76,509	.....	80,579	.....	.....	.....

a Revised.

PRODUCTION AND STOCKS OF CLINKER BY MONTHS, IN 1932 AND 1933 (*In thousands of barrels*)

Month	Production		Stocks End of Month		Month	Production		Stocks End of Month	
	1932	1933	1932	1933		1932	1933	1932	1933
January	6,107	3,036	8,184	6,092	July	6,613	8,569	7,889	6,832
February	5,176	3,110	9,375	6,422	August	7,078	7,835	7,175	6,474
March	5,443	4,147	10,025	6,890	September	7,703	5,600	6,708	6,507
April	5,924	4,520	10,511	7,146	October	7,259	4,745	6,093	*a*6,204
May	6,273	5,848	9,922	6,769	November	6,290	4,329	5,938	5,881
June	6,803	7,836	8,877	6,840	December	4,335	.....	5,995	.....

a Revised.

DISTRIBUTION OF CEMENT (*a*)

Shipped to—	October		November		Shipped to—	October		November	
	1932	1933	1932	1933		1932	1933	1932	1933
Alabama	27,450	32,561	46,722	57,406	New Jersey	272,420	194,234	178,586	148,810
Alaska	264	660	528	396	New Mexico	16,950	14,286	12,752	14,856
Arizona	15,107	12,902	11,747	11,354	New York	1,128,337	707,697	623,446	401,337
Arkansas	*b*30,537	32,535	*b*32,310	41,274	North Carolina	32,846	53,953	30,813	44,302
California	376,227	463,481	368,806	418,928	North Dakota	28,437	14,299	3,590	2,410
Colorado	38,567	53,800	30,044	27,782	Ohio	586,904	329,330	248,100	168,128
Connecticut	71,770	63,147	55,588	71,218	Oklahoma	116,502	109,035	119,817	104,154
Delaware	26,516	39,731	28,807	18,440	Oregon	47,454	37,122	19,121	19,693
Dist. of Col	113,725	80,248	88,796	75,016	Pennsylvania	491,038	337,743	*b*375,171	216,593
Florida	37,713	39,827	31,192	52,151	Porto Rico	9,875	6,566	6,850	7,808
Georgia	126,372	68,424	96,639	88,522	Rhode Island	39,206	26,359	19,367	16,662
Hawaii	25,189	15,662	14,050	10,745	South Carolina	14,526	12,232	10,783	19,739
Idaho	12,068	16,063	6,095	10,378	South Dakota	77,355	45,885	6,325	16,238
Illinois	694,410	638,165	272,348	267,761	Tennessee	*b*175,009	72,302	*b*162,184	66,645
Indiana	344,533	238,322	76,993	119,603	Texas	372,878	214,451	363,185	224,131
Iowa	454,027	254,923	86,539	62,921	Utah	26,380	37,359	20,118	23,162
Kansas	120,451	90,896	79,749	85,377	Vermont	17,857	17,524	7,026	10,846
Kentucky	*b*231,952	129,520	*b*88,949	89,705	Virginia	72,578	65,255	57,857	64,199
Louisiana	174,155	68,551	108,552	85,479	Washington	90,017	100,952	45,327	53,916
Maine	27,528	32,294	15,169	12,816	West Virginia	72,893	103,055	43,485	45,933
Maryland	140,141	80,195	101,789	70,027	Wisconsin	290,171	213,054	87,968	75,277
Massachusetts	161,602	148,456	132,313	106,951	Wyoming	10,954	8,587	6,011	7,166
Michigan	501,301	295,558	94,471	106,952	Unspecified	*b*1,019	79,831	*b* 0	87,316
Minnesota	232,531	195,647	35,044	51,638		8,712,250	6,727,741	4,732,008	4,418,776
Mississippi	*b*83,474	66,298	*b*79,075	63,345	Foreign countries	30,750	22,259	49,992	44,224
Missouri	*b*375,350	339,039	*b*158,669	299,324	Total shipped from cement plants	8,743,000	6,750,000	4,782,000	4,463,000
Montana	16,038	14,894	5,997	11,216					
Nebraska	149,984	153,159	49,924	56,758					
Nevada	59,278	227,551	61,177	187,182					
New Hampshire	52,384	34,121	26,044	18,790					

a Includes estimated distribution of shipments from two mills in October, 1933; from three mills in October and November 1932, and in November, 1933.
b Revised.

PRODUCTION AND STOCKS OF CLINKER (Unground Cement), BY DISTRICTS, in NOVEMBER, 1932 and 1933 (*In thousands of barrels*)

District	Production		Stocks at End of Month	
	1932	1933	1932	1933
Eastern Pa., N. J., and Md	1,004	482	732	790
New York & Maine	317	266	394	226
Ohio, Western Pa., and W. Va	748	208	459	550
Michigan	273	97	801	718
Wis., Ill., Ind., and Ky	1,060	657	345	484
Va., Tenn., Ala., Ga., Fla., and La	603	417	440	454
Eastern Mo., Ia., Minn. and S. Dak	834	693	325	371
W. Mo., Nebr., Kans., Okla., and Ark	562	421	402	412
Texas	324	168	172	234
Colo., Mont., Utah, Wyo., and Idaho	109	110	306	113
California	351	688	1,264	1,314
Oregon and Washington	105	122	298	215
Totals	6,290	4,329	5,938	5,881

a Revised.

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN NOVEMBER, 1932 AND 1933 AND STOCKS IN OCTOBER, 1933 (*In thousands of barrels*)

District	November						Stocks at End of October *a*
	Production		Shipments		Stocks at End of Month		
	1932	1933	1932	1933	1932	1933	1933
Eastern Pa., N. J., and Md	1,002	613	1,115	815	3,681	3,787	3,990
New York & Maine	328	296	364	278	1,278	1,754	1,735
Ohio, Western Pa., and W. Va	757	246	417	321	2,692	2,818	2,893
Michigan	312	169	158	144	1,406	1,641	1,616
Wis., Ill., Ind., and Ky	988	679	503	520	1,872	1,820	1,662
Va., Tenn., Ala., Ga., Fla., and La	680	447	518	497	1,440	1,481	1,530
Eastern Mo., Ia., Minn. and S. Dak	894	747	379	462	2,029	2,278	1,993
W. Mo., Nebr., Kans., Okla., and Ark	546	358	370	387	1,710	1,644	1,674
Texas	351	132	352	218	554	628	714
Colo., Mont., Utah, Wyo., and Idaho	107	149	87	95	568	400	346
California	424	629	455	654	1,033	991	1,016
Oregon and Washington	73	207	64	72	525	469	333
Totals	6,462	4,672	4,782	4,463	18,788	19,711	19,502

a Revised.

Traffic News and Comment

Recent I. C. C. Decisions

Agricultural Limestone.—The commission has found not justified certain reduced rates published by the Missouri-Illinois R. R., to apply on agricultural limestone from Bonne Terre, Mo., and other points in Missouri, to destinations in Illinois on its own line which were reductions made for the purpose of meeting motor-truck and other competition. The carrier proposed rates to destinations on the main line as far north as Nashville of 73 c. and the commission found justified a rate of 78 c. The 73 c. rate was also proposed to apply to destinations on the Chester and Rosboro branches, and the 78 c. rate was found justified. To points on the main line as far north as Centralia a rate of 76 c. was proposed and a rate of 81 c. found justified.—I. C. C. I. & S. Docket No. 3,871, Agricultural Limestone via Missouri-Illinois R. R.

Cement.—After further hearing the commission has found that the rates on cement from Dewey, Okla., and points in the Kansas gas belt to destinations in Colorado and Wyoming are not unreasonable but that they are unduly prejudicial to shippers at Dewey and in the Kansas gas belt and unduly preferential of shippers located at Portland and Boettcher, Colo., and Laramie, Wyo. The rates from the Colorado and Wyoming points were found preferential to the extent that they were less than the rates made by using the average of cement Scales III and IV, prescribed in Western Cement Rates, 69 I. C. C. 644, car-load minimum weight 50,000 lb., for distances more than 80 mi. by highway from the preferred points. This basis was also found just and reasonable for intrasate movement in Colorado and Wyoming. New rates are to be made effective not later than March 5.—I. C. C. Docket No. 22,020, Iola Cement Mills Traffic Assn. *et al. v.* A. T. & S. F. *et al.*

Sand.—In response to fourth-section application No. 15,294 the commission has granted relief from the long- and short-haul clause of the fourth section to carriers parties to Johanson's I. C. C. No. 2,496, in connection with the rates on silica sand from Millington, Oregon, Ottawa, Sheridan, Utica and Wedron, Ill., and Brownstown, Wis., to destinations in the southwest. The lowest rates that may be established under this authority are made by adding 87 c. per net ton for shipment in box-cars and 86 c. per net ton for shipment in open-top cars to the rates contemporaneously in effect from St. Louis, Mo., to the same destinations, subject to Rule 27, and applied as maxima from intermediate points of origin and subject to the usual 50 and 33 1/3-per cent. circuity limitations.—I. C. C. F. S. O. No. 11,426.

Examiners' Reports

Cement.—Examiner Carl A. Schlager recommends that the commission award reparation on a finding that the rate on natural cement from Speed, Ind., to Waco, Tex., was unreasonable to the extent that it exceeded a rate made by using Scale III prescribed in 128 I. C. C. 63, Oklahoma Portland Cement Co. *v.* D. & R. G. W., computed over the shortest distance over a route in which the M. K. & T. could participate as a line-haul carrier.—I. C. C. Docket No. 26,013, Louisville Cement Co. *v.* Penna. *et al.*

In his proposed report Examiner J. Edgar Smith recommends that the complaint of cement manufacturers in Oregon and Washington, attacking the rates on cement from points in California to California ports for transshipment as being unduly preferential, be dismissed. The transshipment rates from interior California points to the Pacific Coast ports are lower than the local rates. Complainants allege that undue preference exists by the amount of this difference. The examiner suggests that the ability of California cement producers to market their products in Washington and Oregon is not the result of an unreasonable freight rate structure, but a commercial advantage over which the commission has no jurisdiction.—I. C. C. Docket No. 25,428, Beaver Portland Cement Co. *et al. v.* California Central *et al.*

Sand and Gravel.—Examiner L. B. Dunn proposes that the commission award reparation on finding that the rate on sand and gravel from Rock Island, Ill., to Davenport and Bettendorf, Ia., was unreasonable but not otherwise unlawful, to the extent that the rate charged of 47 c. exceeded a reasonable rate of 35 c., exclusive of the authorized emergency charges.—I. C. C. Docket No. 26,039, Rock Island Sand & Gravel Co. *v.* C. B. & Q. *et al.*

Rate-Committee Dockets

Consolidated Classification Committee

Roasted Dolomite.—Carriers propose that the description in the consolidated classification, "Dolomite, Roasted," be changed to read, "Dolomite, Roasted (Refractory Dolomite, in granular form, treated or untreated, clinkered, and/or burned to a dead state"). They also propose that the car-load minimum weight be increased from 40,000 lb. to 60,000 lb.—Docket No. 56, Sub. No. 183.

New England Freight Assn.

Crushed Stone.—Carriers propose to reduce the rate on crushed or broken stone loaded in open-top equipment,[1] from Westfield (Hampden Quarry), Mass., to New Canan, Conn., from $1.35 to $1.15 per net ton.—Docket No. 31,583.

Sand.—Carriers propose to cancel that part of the mileage scale applying on building, common or run-of-bank sand from stations named in New Haven I. C. C. F-2,795, p. 394, above 75 mi.—Docket No. 31,619.

Trunk Line Assn.

Cement.—A rate on cement, car-load minimum weight 50,000 lb., to Greenwich and Greenwich Jct., N. Y., from Security and Union Bridge, Md., of 21 c. and from York, Pa., of 20c. per 100 lb., is proposed by carriers.—Docket No. 31,686.

Crushed Stone.—An increase in the rate on crushed stone,[1] from Munns, N. Y., to Canastota, Wampsville and Oneida Castle, N. Y., from $1.00 to $1.10 per net ton is proposed by carriers.—Docket No. 31,763.

Ground Limestone.—In order to compete with Bainbridge and Chester Valley districts shippers at Annville, Cedar Hollow, Cold Point, Hummelstown, Mill Lane, Myerstown, Palmyra, Plymouth Meeting, Shainline, Swatara and Williams, Pa., are asking for a rate on ground limestone, car-load minimum weight 50,000 lb., to Quantico, Va., of 14 c. per 100 lb.—Docket No. 31,671.

Lime.—Shippers at Rosedale and Binnewater, N. Y., are proposing a line of rates on building lime with a lower basis on chemical and land lime, car-load minimum weight 30,000 lb., to destinations in New York on the West Shore R. R. A statement of proposed rates will be furnished on request.—Docket No. 31,672.

Central Freight Assn.

Cement.—Shippers are asking that the rate on cement, car-load minimum weight 50,000 lb., from Painesville, O., to Johnstown and Gloversville, Pa., be reduced to 21 c. per 100 lb.—Docket No. 37,876.

Crushed Stone.—A reduction in the rate on crushed stone in open-top cars from Painesville, O., to Chardon, O., to 40c. per net ton is proposed by shippers.—Docket No. 37,874.

Carriers propose to reduce the rate on crushed stone in open-top cars, from Piqua, O., to New Carlisle, O., from 80 c. to 70 c. per net ton.—Docket No. 38,140.

Shippers at Middlepoint, O., are asking for a reduction in the rate on crushed stone and related articles, to Huntington, Ind., to 95 c. per net ton.—Docket No. 38,158.

Fluxing Stone.—A reduction in the rate on fluxing stone from the Bloomington-Bedford district to Middletown, O., from $1.40 to $1.25 per net ton is proposed by carriers.—Docket No. 38,004.

Sand and Gravel.—A reduction in the rate on common sand and gravel in open-top cars from Painesville, O., to Chardon, O., to 40 c. per net ton is requested by shippers.—Docket No. 37,873.

Shippers request the establishment of a commodity rate on common sand and gravel from Hamilton, O., to Springfield, O., of 90 c. per net ton.—Docket No. 37,875.

Slag.—A reduction in the rate on granulated slag from Neville Island, Pa., to Carnegie, Pa., from 60 c. to 45 c. per net ton is proposed by shippers.—Docket No. 37,896.

Further reductions in rates from Neville Island to various Pennsylvania destinations ranging from 45 c. for a 9-mi. haul to 70 c. for a 40-mi. haul are proposed by shippers. Statement of proposed rates will be furnished on request.—Docket No. 38,089.

Illinois Freight Assn.

Crushed Stone.—It is proposed to reduce the rate on crushed stone [1] from Buffalo, Ia., to Whitton, Ill., from $1.51 to $1.13 per net ton.—Docket No. 7,588.

Sand and Gravel.—A rate of 70 c. per ton on sand and gravel from Decatur, Ill., to Springfield, Ill., for deliveries other than the I. T. has been proposed.—Docket No. 7,597.

It is proposed to publish rates on sand and gravel to various points on the I. C. in Illinois the same as now apply from Utica, Ill.—Docket No. 7,599.

Southern Freight Assn.

Cement.—Carriers propose to increase the rate on cement from Kosmosdale, Ky., to Upton and Welborn, Ind., from 11½ c. to 12 c. per 100 lb.—Docket No. 3,498.

Shippers propose the following reductions in ground limestone rates, car-load minimum weight 60,000 lb., to Dunn, N. C., from Rocky Point, Va., $1.70; Eagle Mountain, Va., $1.80; Indian Rock, Va., $1.70; Falling Springs, Va., $1.90 per net ton.—Docket No. 3,435.

Southwestern Freight Bureau

Lime.—A reduction in the rate on lime, car-load minimum weight 40,000 lb., from Mosher and Ste. Genevieve, Mo., to Portland, Colo., from 38½ c. to 36½ c. per 100 lb., is proposed by carriers.—Docket No. 2,443.

Shippers propose a reduction in the rate on lime, car-load minimum weight 30,000 lb., from Austin and Dittlinger and grouped Texas points to Mobile, Ala., Pascagoula and Moss Point, Miss., from 30 c. to 23 c. per 100 lb.—Docket No. 2,444.

Carriers propose the establishment of a line of reduced rates on lime from Ft. Scott, Kan., and Springfield, Mo., to destinations on the Ft. S. & W. A statement of proposed rates will be furnished on request.—Docket No. 2,516.

Shippers propose a rate on lime, car-load minimum weight 30,000 lb., from the Dittlinger-New Braunfels, Tex., group to destinations on the Y. & M. V. between Baton Rouge and New Orleans, La., of 20½ c. per 100 lb.—Docket No. 2,551.

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[1] The car-load minimum weight will be 90 per cent. of the marked capacity of the car, except that when loaded to its full cubical or visible capacity, the actual weight will apply.

New Machinery and Supplies

Blasting, Excavating and Handling

Improved Explosives and Caps

The Atlas Powder Co., Wilmington, Del., during 1933 developed a new Atlas "Accordion Fold" electric blasting cap which is said to set a new standard of safety and ease of handling. In this cap the wires are folded accordion-wise and the folds laid around the blasting cap in such a manner as to protect and cushion it on all sides against mechanical shock. The round paper tube which encloses the cap is indented around its circumference at the middle so that a simple pressure of the fingers opens the package along the indented line. The wire is then easily extended to any desired length without danger of kinking or the cap end can be straightened for priming without disturbing the remainder of the wire. The regular Atlas metal safety shunt and the insulated match head are used to give protection from stray electric currents.

Atlas Apex No. 1 explosive.

Another development of the year is Apex No. 1, a new rock explosive particularly adapted to quarry blasting and allied work. This is a high explosive of the low density type and, it is said, was developed in line with a need for an explosive of the dynamite type which creates a force capable of gaining greater purchase on the burden without the violence of other straight high explosives. Apex is said to generate a force of low violence as regards shattering action but has sufficient power to destroy the crystalline nature of the rock.

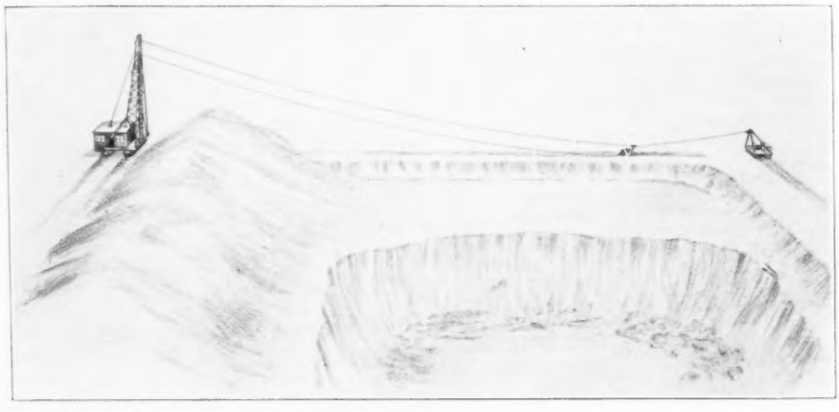
Slackline Scraper Excavator

A development of the year by Sauerman Bros., Chicago, Ill., is the new Sauerman slackline scraper excavator for digging and conveying materials. This unit is a combination of the drag scraper and the slackline cableway. The regular Crescent scraper bucket is used and is attached to a carrier which rides on a track cable. In digging and conveying the method of operation resembles that of the standard drag scraper, but in dumping the bucket is lifted into the air by tightening the track cable. The force of gravity is then allowed to carry the empty bucket back to the digging point.

These new machines are available in a number of sizes with capacities ranging from 200 to 500 tons per hr. and with operating spans up to 1,000 ft. in length. For gravel work the machine is usually furnished with a steel mast and the scraper bucket is swung around in radial lines of operation. For digging long banks or for stripping overburden the machine may be equipped with a self-propelling head tower and a small movable tail tower.

Another development of the year was the production of a new line of low-priced Crescent drag scrapers. The new "Utility" line of Crescent drag scrapers is said to be particularly suitable for use with portable and semi-portable screening and crushing plants and for any light excavating that calls for moving materials in quantities of from 10 to 100 cu. yd. any distance up to 500 ft. For larger capacities, longer hauls, and unusually tough digging conditions, the manufacturer states that it is preferable to use the standard Crescent drag scrapers which are of heavier construction.

There are five models of these "Utility" Crescent scrapers with buckets ranging in capacity from 9 to 40 cu. ft., and operating spans ranging from 100 to 500 ft. The complete unit includes a specially-designed 2-speed power unit equipped with either a gasoline or electric motor or with a belt pulley.



Sauerman slackline scraper excavator.

New Machinery and Supplies in 1933

The manufacturers of machinery and supplies for the nonmetallic-mineral industries during 1933 again failed to show the slightest letdown in the development of new and improved equipment for these industries. Hundreds of new or improved devices were brought out, most of them designed to reduce operating costs and increase efficiency. Prices are firmer and there is less price-cutting, due mainly to the manufacturers' codes of fair competition now in effect. Prices in most lines have not yet been adjusted sufficiently to compensate for the increased cost of manufacture under these codes. Sales showed little improvement early in the year but have been increasing rapidly in the last few months. This improvement can be attributed to a number of reasons. The general feeling among the producers is now one of optimism due to better material prices under the various industrial codes and the prospects for future business. The CWA has started a growing immediate demand for material, and work under way under the PWA promises a heavy demand for material in the spring. No attempt is made to record all of the improvements in equipment during the year in the following pages but only some of the more important developments.

All-Steel Well-Drill

The Keystone Driller Co., Beaver Falls, Pa., put on the market a new well drill, No. 71, which was claimed to be the first and only all-steel full-crawler-mounted percussion drill ever made for drilling holes of 6-in. and smaller diameter. This machine also uses chain drives throughout and has dual-spring shock absorbers

Keystone all-steel well-drill.

for wire drilling. Although the machine can be used for larger holes it is said that maximum economy is obtained in drilling 6-in. holes. It will drill to a depth of 900 ft. and is especially suited to drilling in limestone and sandstone. All high-speed parts run in large ball and roller bearings. Roller chains eliminate slippage and reduce bearing loads and also contribute toward the compactness of the machine.

Heavy-Duty Sand Pump

The Kansas City Hay Press Co., Kansas City, Mo., developed a new "Lightning" heavy-duty sand pump which has a number of novel features said to add greatly to the efficiency of the pump. The shell, runner and renewable side discs are all made of extra-heavy semi-steel. The stuffing box area is protected against the intrusion of sand particles by a large-capacity water seal and by a special cup-leather seal around the shaft next to the runner.

An adjustable floating steady bearing is provided next to the runner and back of the water seal, eliminating excessive overload on the main bearing due to overhang of the runner. The runner has a taper bore and can be removed without removing the shaft from its position. The main bearings are provided with two extra-

heavy double-row ball bearings which are encased and run in oil. The pumps are at present available in the 8-in. and 10-in. sizes.

Wire-Rope Socket

The American Steel & Wire Co., Chicago, Ill., brought out the new Fiege Tiger-Claw wire-rope socket which is claimed to eliminate the difficulty and danger of wire rope socketing. This socket

New wire-rope socket.

is composed of three simple parts, a socket, a sleeve and a plug. No flame or hot metal is required in the operation. They are made in sizes for wire rope of ⅜-in. diameter and larger. A circular published by the company gives instructions for attaching these sockets.

Heavy-Duty Dredge Pump

The Morris Machine Works, Baldwinsville, N. Y., added to its line of centrifugal pumps the Type F heavy-duty dredging pump which was developed specially for handling extremely abrasive mixtures against high heads. All of the parts in this pump subject to wear, such as the casing, impeller, disc, liners, sealing and throat rings, are made of semi-steel, manganese steel, or special Morris alloys. The casing and impeller are of large diameter so that the pump will run at a comparatively low speed even when operating against a high head.

The position of the impeller can be adjusted from the outside of the pump to take up wear on the suction sealing ring and prevent internal leakage. All parts are heavily proportioned for strength and rigidity and the parts subject to greatest wear are designed to permit quick and economical replacement when necessary. These pumps are said to be especially suited for handling sand and gravel and for general dredging service where the material is to be delivered at a high elevation or through long pipelines.

Fully-Convertible Excavator

The Marion Steam Shovel Co., Marion, O., added to its line a complete series of fully-convertible clutch-type excavators. They can readily be converted from shovel to dragline, crane, clamshell, or trench shovel or vice versa.

These excavators have a primary power unit, either gasoline, Diesel, or a single electric motor, connected through a master clutch and speed reducing mechanism directly to the main machinery. The various functions of hoisting, traveling, swinging, crowding and booming are independently controlled through friction clutches. The crawlers are chain driven and, in addition to the two drive sprockets for each crawler, an intermediate roller is provided for each shoe. The main lower frame is a single steel casting and the swing gear is a one-piece steel casting bolted and dowelled to the top of the frame.

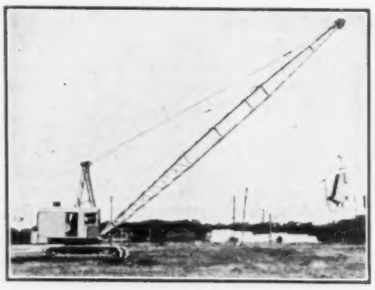
Marion excavator.

A type of external contracting band clutch is used, the dipper is of oversized capacity, the shovel boom is all-steel, and the dipper handle is of the outside type, made of a combination of hard wood and steel. The boom for dragline, clamshell or crane is of latticed angle construction with removable middle sections. Antifriction bearings are used wherever possible.

Large, Mobile Drag-line

The Northwest Engineering Co., Chicago, Ill., announced a new dragline of greater capacity than the 2-cu. yd. model which was brought out earlier. This machine, it is claimed, combines large capacity with the simplicity, mobility and economy ordinarily not found in machines of this size.

The power plant is an 8-in. by 9-in. Northwest-Twin City engine, operating at slow speed, which is said to have torque characteristics and hanging-on qualities that meet with dragline requirements.



Northwest drag-line.

Power takeoff is through helical cut gears enclosed and mounted on ball and roller bearings and running in oil. The Northwest cushion clutch is standard equipment and guards against overloads. It transmits full engine power but reduces maximum stresses on every part under power when the hoist rope is tensioned. Swinging clutches are of the cone type and are provided with oversize blocks.

Steering is accomplished in the usual manner with positive traction on both crawlers while turning as well as when going straight ahead. All gears in the crawler base are fully enclosed by a heavy housing and the gears run in oil. Treads are self-cleaning. The use of hold-down rotating rollers in effect doubles the diameter of the rotating path and results in many advantages including compactness, short tail swing, etc.

Convertible Shovel

A new 1¾-cu.yd. shovel, dragline and crane has just been announced by The Ohio Power Shovel Co., Lima, Ohio. This new machine is known as the Type 701 and is powered by a six-cyl. gasoline engine. Provision is made, however, for installing Diesel or electric power units when desired. Gears are the quiet long-lived helical cut type and friction is practically eliminated by the use of roller bearings at every vital bearing point. The use of square lever shafts eliminate keys. Shafts on which are mounted sliding members are splined for accuracy in fit and elimination of backlash. Cable life is lengthened by the use of drums with exceptionally large diameters. Each drum is of sufficient diameter to accommodate extra long cables without double wrapping. Synchro-power clutches are said to respond smoothly to the sdightest motion of the control levers. All major motions are independent, therefore making it possible to hoist, travel, swing, steer, and raise or lower the boom simultaneously.

The boom and dipper handle are of box-type construction and the manganese dipper is cast in one piece with detachable lip. The crawler truck is the open-roller type with provisions made for applying extensions in the field whenever greater bearing surface is required. The machine is easily and quickly converted into various combinations by simply changing front end equipment.

Convertible Diesel Shovel

The Speeder Machinery Corp., Cedar Rapids, Ia., introduced a new lightweight, convertible Diesel shovel, the Speeder D4, which was claimed to be the first light full-Diesel shovel to be built in this country. This model is rated at ⅝-cu.yd. capacity for shovel, crane, dragline, or pull-shovel work. Both the crane and dragline booms are 35 ft. long, the shovel boom is 18 ft. long, and the shovel dipper stick is 14 ft. long. The shovel can be obtained with a standard Speeder dipper or a manganese dipper for heavy rock work.

The Speeder D4 is powered with a Caterpillar Diesel engine and a Morse lubricated silent chain transmits the power to the mechanism. The travel gears are heat treated and the crawlers are a new lug-driven friction-free type. All shafts are dead end and no shafts revolve in the drums, allowing both to stop immediately after their function is performed. The complete shovel unit when assembled ready for use weighs only 15 tons.

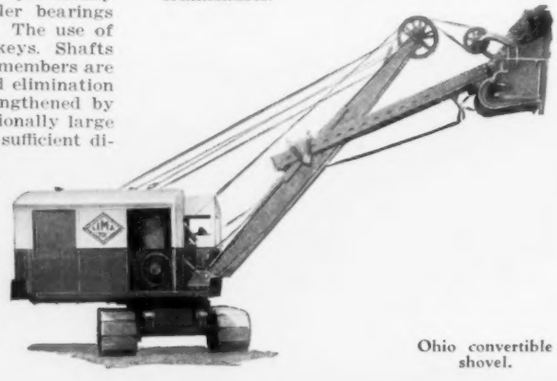
Trucks, Tractors, Locomotives

All-Wheel Drive Trucks

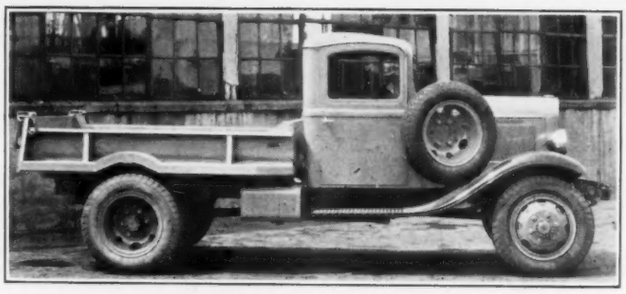
For 1934 the Marmon-Herrington Co., Inc., Indianapolis, Ind., offers the most complete line of all-wheel-drive trucks and truck-tractors in its history. This line consists of four series and twenty-one models of 4- and 6-wheel-drive trucks and truck-tractors ranging from 1½ tons upward. All vehicles are offered in either two or three wheel-base lengths and most of them can be purchased in one or two tire sizes. In reality, there are said to be 48 different types, each with a particular place in the truck field.

Five smaller 4-wheel-drive models are grouped in the newest series, known as the A Series. There is one 1½-ton model, one 2½-ton model, one 3½-ton model and two 4-ton models. The next series is known as the TH-4 Series and comprises six 4-wheel-drive models ranging in capacity from 4½ to 9 tons. Five 6-wheel-drive models are grouped in the TH-6 Series. These have capacities of 10 to 20 tons. The fourth group is the THD Series and this consists of six models powered by Diesel engines. Three of these models are 4-wheel-drive units and the other three are 6-wheel-drive models. Capacities range from 7 to 20 tons.

The entire new line is built around the exclusive Marmon-Herrington type of all-wheel-drive design and construction. All of the new trucks have certain features in common, such as front axle design, and auxiliary transmissions to supplement the standard transmissions. The heavy-duty 6-cylinder engines all have 7-bearing crankshafts.



Ohio convertible shovel.



All-wheel-drive Marmon truck.

Another feature of all models is low center of gravity.

The Model A10-4 is offered on wheelbase of 135, 143 and 155 in. It has single front and dual 6.50 by 20-in. tires on the rear with 7.50 by 20-in. tires optional at slight additional cost.

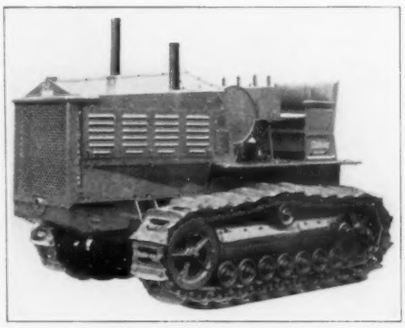
The Model A10-4 has both standard and auxiliary transmissions with a total of 8 forward speeds and 2 reverse. The 85-hp. engine has 228-cu.in. piston displacement and a rating of 156 ft.-lb. torque. Downdraft carburetion and an air cleaner are standard. Internal expanding 4-wheel hydraulic brakes are employed as well as a Ross cam-and-lever steering system. Wheels are of the 6-stud steel disc type. In the new TH-4 Series all models have Westinghouse air brakes, standard and auxiliary transmissions, and gasoline engines with as much as 180 hp. and 550 ft.-lb. torque. Similar features characterize the new TH-6 Series. Specifications of the 6 Diesel-engined models in the THD Series are the same as corresponding gasoline-engined models with the exception of the necessary installation changes.

Gasoline and Diesel Tractors

The Cleveland Tractor Co., Cleveland, O., announces a Diesel crawler tractor in the 80-hp. class, which develops 85 hp. in second gear. Other than engine, the Cletrac Diesel has the same specifications as the gasoline powered Cletrac 80. Electrical equipment of ample capacity is standard on the Cletrac Diesel and, wherever possible, the features of the Cletrac 80 gasoline engine have been incorporated in the Diesel engine. For example, the underhung crankshaft and the "through" bolts which pass through the cylinder heads, block, crankcase and main bearing caps so that all vertical stresses are transferred from the cylinder heads directly to the crankcase, have been included as features in the Cletrac Diesel engine. A Bosch fuel distributing pump and fuel pump are used. The fuel delivery tubes lead from the pump to the nozzles on the left side of the engine.

The new "Cletrac" 20 gasoline tractor which has an N.A.C.C. rating of 25.6 hp. is also a development of the year. The engine is a 4-cyl. L-head unit with a 3-bearing crankshaft and cylinders cast en bloc. A gear-driven pump supplies oil by pressure through a filter to the crankshaft, connecting rods and timing gears.

The clutch is of the 10-in. double-plate push type and the transmission has three speeds forward and one reverse. The gears and shafts are of heat-treated alloy steel operating on heavy-duty ball bearings and are lubricated by a plunger pump. Steering is through a planetary compensating differential, actuated by the engine, giving positive power on both tracks when turning. The tracks consist of 54 drop-forged 11-in. steel shoes with interchangeable grousers. Drive sprockets are of cast steel with alloy steel shafts and there are five lower and one upper track wheels.

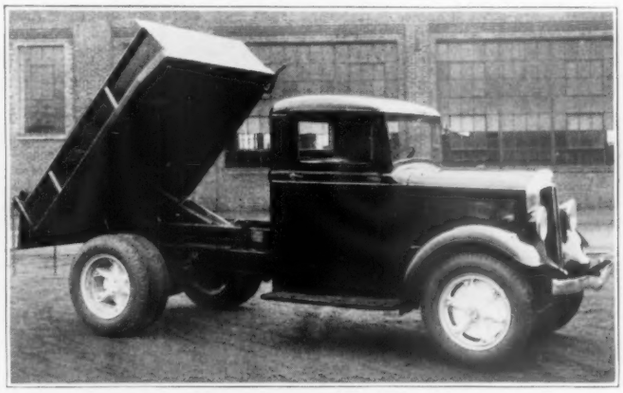


Cletrac Diesel tractor.

Enters Low-Price Field

The White Co., Cleveland, O., announced two entirely new 6-cyl. trucks, Models 701 and 702, which made the company a competitor in the low-priced field for the first time in its history. Features of both models are, 6-cyl. engines of 75 hp. with Stellite screwed-in valve seats, rifle-drilled oil passages on all main bearings and rods, 4-wheel automatically-equalized power-assisted hydraulic brakes, safety springs, and heat-treated engine and chassis parts. A new chassis arrangement is also said to give a greater payload on a shorter wheelbase. These new models are available with 132 and 156-in. wheelbases.

The White Co. also developed a Model K series for modified load distribution which are available on all standard White models. These units are designed to carry more of the weight of pay load and body on the front axle than do the standard models on the same wheelbase. This series was brought out because of the increasing number of states which have passed highway legislation restricting axle weights and overall lengths.



Model 702 White truck with steel dump body.

Mechanical-Drive Locomotive

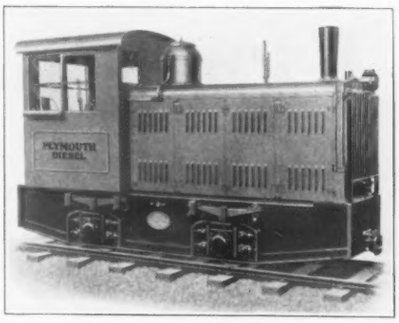
The Whitcomb Locomotive Co., Rochelle, Ill., in 1933 developed a new 12-ton, Diesel-powered, mechanical transmission drive locomotive. This machine is powered with a 6-cyl., full Diesel engine rated at 85 hp. at 1200 r.p.m. The locomotive frame is a unit casting with integral engine and transmission mountings. Semi-elliptical springs with full cross equalization are used. The clutch is of the multiple-disc, cork insert type running in oil. Transmission is by selective gears, 4 speeds forward and 4 reverse. Drive is from a jack shaft directly to the rear axle by two chains and from rear axle to front axle by a single chain. The Whitcomb series of Diesel locomotives now ranges from 8 to 30 tons with mechanical drive and from 30 to 60 tons with electric drive.

New Diesel Locomotive

Two new Plymouth Diesel Locomotives, one an 8-ton, the other a 12-ton, both of which are equipped with Caterpillar Diesel engines, have just been brought out. The 8-ton locomotive is powered with a 4-cyl. engine which develops 66 hp. at 850 r.p.m. The 12-ton locomotive is equipped with a 6-cyl. engine developing 102 hp. at 820 r.p.m.

One of the new features is the one-piece frame built of steel plates solidly welded together and thoroughly braced.

The clutch is of the dry-plate type and is ruggedly and powerfully constructed. It can be easily removed for servicing without interfering with or moving the engine or transmission. There are four speeds forward and four speeds reverse and all gears and shafting are constructed of special heat-treated alloy steel supported on ball and roller bearings. And, as in all Plymouth Locomotives, a heavy-duty sliding gear transmission is standard equipment.

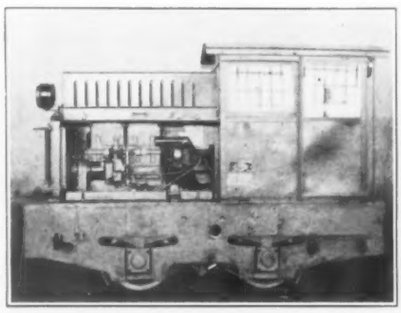


Plymouth 12-ton Diesel locomotive.

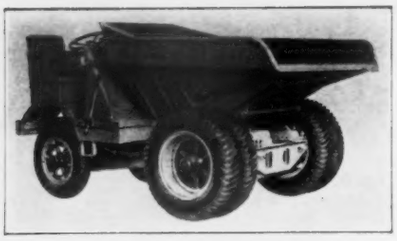
Pneumatic Tires on Dumptor

The Koehring Co., Milwaukee, Wis., enlarged its line in 1933 with a new wheel Dumptor which is said to have many advantages over the original crawler Dumptor for certain conditions. This machine is equipped with 42-in. by 9-in. dual-pneumatic tires on its driving end and 34-in. by 7-in. pneumatics on its steering end. It has a capacity of 4 cu.-yd., a drawbar pull of 8,000 lb. in low gear, and a high speed of 10 mi. per hr. Three speeds in both forward and reverse make a shuttle service possible with this unit, a great advantage for short hauls.

The Wheel Dumptor has a constant-mesh transmission and gear shifting is accomplished by internal gear-type clutches. The engine is a heavy-duty 4-cyl. unit equipped with removable sleeves and has full-pressure lubrication



Whitcomb Diesel locomotive.

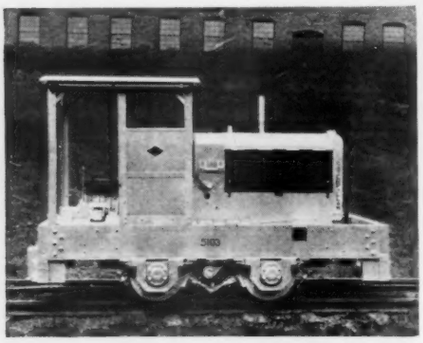


Dumptor on pneumatic tires.

to all moving surfaces. The only grease connection is on the water pump. The engine is governed to run at 1400 r.p.m. by a fly-ball type of governor. The carburetor has two air cleaners, one a centrifugal type and the other an oil-type washer, and there is another air cleaner on the crankcase breather pipe. Optional, interchangeable wheel equipment is obtainable consisting of lugged steel wheels for the drive and regular steel wheels for the steering end.

Locomotive With Diesel Engine

The Brookville Locomotive Co., Brookville, Pa., during the year enlarged its line considerably with the introduction of a number of new types of locomotives. First came the "BCL" series, ranging in size from 6-ton to 12-ton and powered with standard Caterpillar Diesel engines. The 6-ton unit uses the Caterpillar 3-cyl., Model D-6100 Diesel engine which was developed primarily for heavy-duty tractor service. This engine develops 37 brake hp. at 850 r.p.m. with a peak of 47 hp. for intermittent loads. The chassis is almost the same as those used for the company's



Brookville Diesel locomotive.

line of gasoline locomotives and is of heavy rugged construction. Features are: the double structural steel frame on which the engine and transmission are mounted on a sub-frame inside the main frame to which the wheels are attached; 4-speed sliding gear transmission with an all-speed reverse; dual spring suspension; oversize roller chain drive to four wheels; drive wheels with replaceable, high traction steel tires; Timken tapered roller bearings on lower axles.

Crushing—Grinding

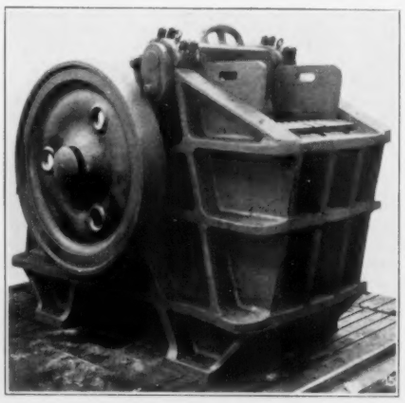
Primary Jaw Crusher

The Fried. Krupp Grusonwerk, A.G., Magdeburg-Buckau, Germany, through its American representatives, Thomas Prosser & Son, New York City, during the year announced the manufacture of a complete line of gyratory primary crushers. These crushers are of the latest type and are very compact in design, requiring very little head room. They are made in standard sizes with openings ranging from 31½-in. up to 10 ft. 2-in. in size.

These crushers have a conical crushing head secured to a suspended vertical shaft, the lower end of which is guided in an eccentric bushing. The crushing head and collar, which are subjected to maximum wear, are made either of hard alloy steel or chilled castings, as desired. Every wearing part in these crusners is exchangeable and may be readily replaced.

A complete line of jaw crushers in sizes ranging from about 4-in. to 5-ft. width of crusher opening with capacities of from 15 cwt. to 400 tons per hr. and with power consumptions of from ½ to 180 hp. was also announced. These crushers may be obtained with one-piece cast-iron or steel frames or with cast-steel frames of the sectional or built-up type. The jaw plates and side wedges are obtainable in manganese steel or chilled castings, as desired. They are readily exchangeable and are made with the jaws ribbed to suit any particular material. The jaw plates are reversible so that when one end becomes worn it can be reversed and its length of service doubled. The toggle plates also are supported on exchangeable bearings. In all of these crushers the rocking jaw is vertical and is actuated by an eccentric-operated vertical pitman and toggle plates.

A complete line of Krupp compound tube-mills in sizes and types to meet any requirements is also available. These mills have three compartments and are available in sizes from about 4 ft. 6 in.



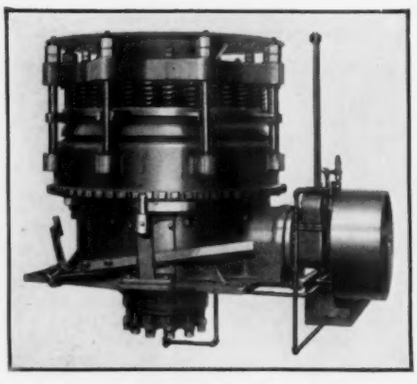
Krupp jaw crusher.

to 9 ft. 3 in. in diameter and from about 29 ft. to 50 ft. in length.

The Krupp tube-mill is suitable for either wet or dry grinding and may be obtained with any desired type of drive, with circular rack and pinion, with intermediate spur gear or direct coupling to the motor, or with the Krupp patented Centra drive, in which all the moving parts are fully-inclosed, resulting in the greatest possible protection from dust and the greatest degree of safety for the workmen. Both the driving and driven shafts of the Centra unit are equipped with flexible couplings and the drive is applied to the mill through a centrally-applied coupling spindle.

Spherical-Head Secondary Crusher

The Smith Engineering Works, Milwaukee, Wis., added to its line of jaw, cone and gyratory crushers a new secondary



Telsmith secondary crusher with spherical head.

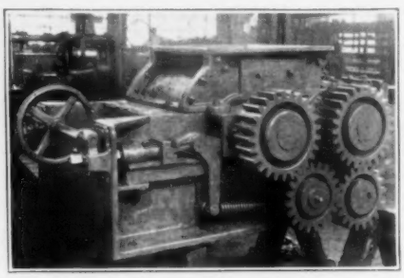
crusher known as the Gyrasphere. This crusher, which is said to assure a cubical product with a minimum of oversize slabs and splinters, is made in three sizes, Nos. 24, 36, and 48, these numbers denoting the bottom diameters of the heads in inches. The No. 24 unit is rated to crush from 15 to 25 tons at ⅜-in. discharge, to 30 to 50 tons at 1-in. discharge. The No. 48 unit is rated at 85 to 120 tons with ¾-in. discharge to 170 to 210 tons at 1½-in. discharge.

The crushing members consist of a spherical head fixed on a gyrating shaft and a concave ring. The head and ring are of manganese steel and the shaft is alloy steel. The head and shaft are carried on an eccentric with an anti-friction thrust bearing between them. The shaft rests within the eccentric which is bored at an angle to the crusher axis. The ring can be adjusted by means of a threaded collar and a segmental wedge-shaped ring screw which is turned by means of a horizontal adjusting lever.

The crushing head is impelled by both the gyrated shaft and a cam action produced by the eccentric and the thrust bearing. Because of the spherical shape of the head the greater part of the crushing action is produced by an upward thrust of the head, transmitting most of the pressure to the end-thrust anti-friction bearings. Material is discharged from the crusher through a three-arm spider, the chute being attachable in any desired position.

Double-Roll Crusher

The McLanahan & Stone Corp., Hollidaysburg, Pa., brought out its double-roll steel-strut crusher for primary or secondary reduction. It has a one-piece heavy



McLanahan crusher.

cast frame, is equipped with solid or McLanahan patented segment Macmetal rolls, forged steel roll shafts, and high-carbon steel countershaft. Movement of the movable roll on this crusher is provided for by a swinging housing on the drive shaft. Tramp iron protection is provided for by heavy steel toggles on each side of the crusher. When uncrushable material gets into the crusher the toggles open against heavy springs whose adjustment is not altered by the various adjustments of the crusher opening.

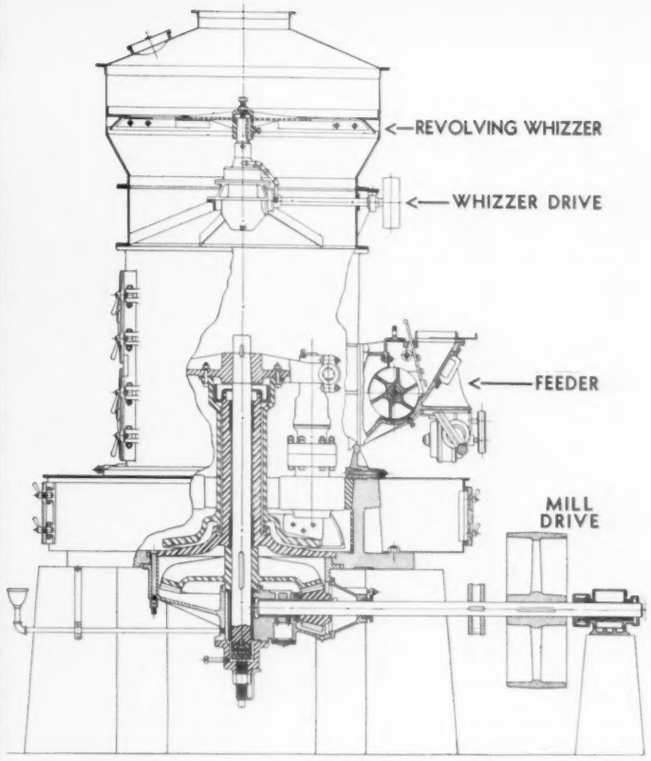
Adjustment for different sizes is made without stopping the crusher by means of a worm gear and hand wheel. No changing of gears is necessary as the gears are always in mesh at any opening because the movable roll housing swings on trunnions concentric with the drive shaft on which the drive gear is located.

Super-Separator Mill

The Williams Patent Crusher and Pulverizer Co., St. Louis, Mo., brought out the Williams improved roller mill and Super-Separator. This mill, using air separation, grinds by the suspended roller or Huntington principle. Grinding is accomplished by rollers suspended from a central spider. As the spider is revolved the rollers are thrown outward by centrifugal force against an encircling bull ring. Plows ahead of each roller scoop up the material and direct it between rollers and bull ring where it is ground with a rolling crushing motion.

The use of heavy duty ball bearings in

Williams roller-mill and Super-separator.



Raymond roller-mill with revolving whizzer.

both roller journals and main spindle has also been an important improvement. Bearings are protected against the entrance of grit by a positive grease seal which is renewed each week by a shot from a high pressure grease gun.

Electric steel castings are used in the fabrication of the roller journals, spider and pot castings. Five sizes of this are available. The smallest is the laboratory size which will pulverize 100 lb. per hr. of limestone to a fineness of 99 per cent. 300-mesh. The largest size is the "Titan" which will grind approximately 5 tons per hr. to the same fineness. Each size is provided with an unusually large door in the mill, big enough to permit a roller journal to be removed without dismantling.

The outstanding feature of this improved mill, however, is said to be the Williams-Hermann Super-Separator. Its function is to extract the finished material and return the oversize for regrinding. Fineness is regulated by the setting of the vanes. Setting them far over with most whirl gives greater fineness, while less whirl delivers a coarser product. An adjustment called the master control changes the setting of all vanes simultaneously and they can be changed from a fineness of 70 per cent. 200-mesh to 99.97 per cent. 325-mesh in less than a minute. An adjustable outlet sleeve offers further variation in fineness. The "Micron Control," consisting of a steel band encircling the vanes controls the average particle size, and on limestone has varied the average particle size from 6 to 13 Microns. All the foregoing separator adjustments are variable from the outside.

Very rigid durable construction predominates in the Super-Separator. Its top is of ⅜-in. thick boiler plate reinforced with heavy steel channels. Vanes are of heavy steel amply thick to prevent distortion.

Roller Mill Air Separator

The Raymond Bros. Impact Pulverizer Co., Chicago, Ill., developed an improved method of fineness control in connection with the air-separating system of the Raymond roller mill. The patented whizzer device, which has been used for some time in the Raymond mechanical air separator, is applied to the roller mill to regulate the fineness of the finished product. The whizzer is mounted on a vertical shaft in an enlarged separator drum above the grinding chamber. It is driven by a small motor through a variable transmission, so that the speed of the revolving whizzer may be changed at will and set at any desired point by means of the control lever on the transmission box.

The effect of the whizzer blades is said to produce positive separation of the fines by throwing the coarse particles out of the air stream and preventing oversize from passing through with the finished material. The fineness of the classified product varies almost directly as the speed of the revolving whizzer. The range of fineness control, it is claimed, is only limited by the range of speed made available by the variable transmission, so that it is possible to obtain any grade of product from fine material to superfine or micron material, approximately within limits of 80 per cent. minus 100-mesh to 99.5 per cent. minus 325-mesh.

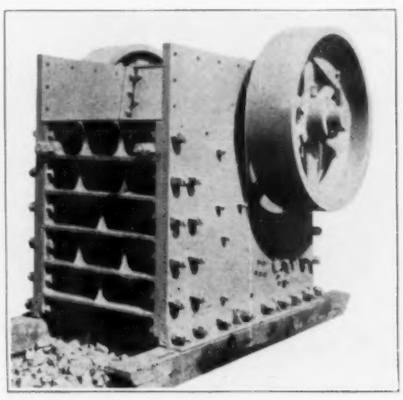
Roller-Bearing Jaw Crusher

The Austin-Western Road Machinery Co., Chicago, Ill., developed the new Western 18-in. by 38-in. roller-bearing primary crusher which is similar in its construction to the No. 940 and 440 crushers which have been on the market for several years.

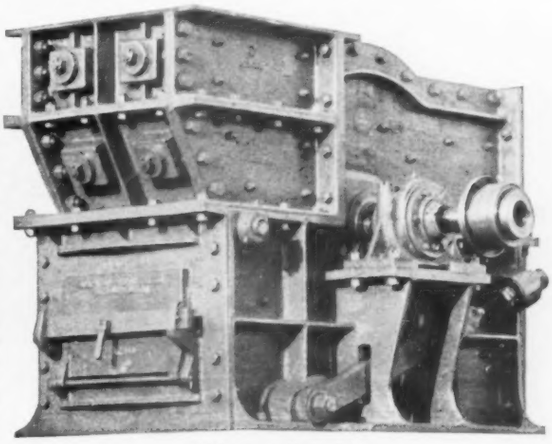
This crusher has a built-up frame with rolled-steel side plates into which the end castings are fitted with keys. It is equipped with manganese steel jaws and check plates which are reversible and easily changed. The shaft and the SKF roller bearings used in this machine are extra large, the bearings being claimed by the company to be the largest ever used in a crusher.

Improved Ring Pulverizer

In 1933 the American Pulverizer Co., St. Louis, Mo., improved and perfected the ACS ring-roll crusher which it introduced in 1932. The patented rolling-ring system consists, briefly, of several rows of rings hung loosely from hangers supported on shafts through disks, all mounted on a



Austin-Western primary crusher.



ACS ring-roll crusher.

substantial main shaft and inclosed in a suitable housing. The material to be crushed enters the machine from the top, falls directly upon and is struck by the rings while in suspension, and is shattered and distributed before reaching the breaker plate. It then falls on the concave, adjustable grinding plate and manganese steel grate bars, where the rings crush the material to the finished output size. In operation the rings, due to centrifugal force, stand at a maximum distance from their hangers or retaining shafts. The rings automatically deflect to allow pieces of foreign or non-crushable material to pass through without injuring the machine. Tramp iron has no effect except when it is too large to pass all clearances. The housing of the crusher consists of heavily-ribbed machined steel castings. All grinding parts may be renewed quickly. The crusher is completely lined with manganese-steel sectional liners. The heavy manganese-steel rings which are the breaking media roll as they crush and wear evenly over their entire outer surfaces. The oversize anti-friction bearings are mounted in dust- and oil-tight housings. All wearing parts are heavy manganese-steel castings. A large range of material sizes is possible by means of adjustable manganese-steel grinding plate.

Ball-Bearing Pulverizer

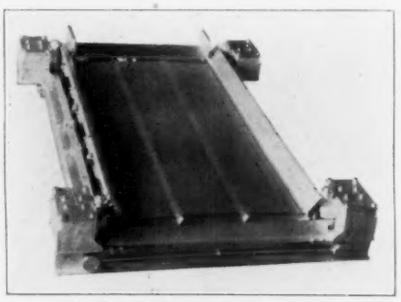
A development of the ball-bearing principle pulverizer, made by The Babcock & Wilcox Co., New York, N. Y., makes available for the direct firing of cement kilns a B&W Type B Pulverizer. The blower-rotor is mounted directly on one end of the motor shaft, while the other end of the motor shaft drives the pulverizer through a "V"-Belt Drive. The top ball race of the pulverizer is driven by the gearing and in turn drives the balls in a circle. The bottom race remains stationary.

In the review of machinery for 1932 the B&W Type B pulverizer for grinding raw material was described. Since that time this machine has also been adapted to the closed-circuit grinding of cement clinker. Comparative determinations of particle size and distribution, it is claimed, showed the product to contain as much flour as the product from open-circuit tube mills. It is said that there is no segregation of high-grindability gypsum from the low-grindability clinker with the high recirculating load of about 3 tons. It was found that the ball-bearing principle of grinding has the inherent characteristic of producing an exceptionally large amount of micron material, when used in closed circuit with a high recirculating load and efficient scavenging.

Screening—Washing

Positive-Drive Vibrating Screens

A new line of positive-drive, anti-friction-bearing, vibrating screens with perfect balance built in is now offered by the Pioneer Gravel Equipment Mfg. Co. of Minneapolis, Minn. Perfect balance built in means that the screen pan is balanced in itself, and that the eccentric



Tyler electric vibrator.

shaft (with heavy steel flywheels machined all over) and the screen pan on the shaft are also balanced after assembly. Dirt-proof steel housings of labyrinth style are used for mounting the heavy eccentric shaft running in heavy-duty self-aligning SKF bearings. The eccentric shaft has these bearings and closures both on the screen pan and the main frame, so that the vibration of the screen pan is created by means of the positive action of the eccentric shaft's ¼-in. stroke. The wire-screen frame embodies a simple and positive means of keeping the cloth in proper tension, and may be quickly removed by loosening the two clamping side bars. The screen pan is adjustable from 22 to 27 deg. as to slope by means of four corner rubber cushions. The screens are run at 1,200 r.p.m. against the flow of material when the slope of the pan is over 22 deg. Pioneer vibrator screens are offered in four sizes ranging from 24-in. by 48-in. to 48-in. by 96-in., and in single- and double-deck forms, except in the larger size, which is also offered with triple decks.

Electrically-Vibrated Screen

A new vibrating screen was placed on the market by the W. S. Tyler Co., Cleveland, O. The Type 400 Vibrator, an electrically-vibrated screen, is a radical departure from the Hum-mer screen manufactured by the company for many years. It provides 1,800 short, powerful strokes per minute combined with a sharp impact. This type of vibration, it is said, allows the material to hug the screen cloth, each particle twisting and turning, the fines working down to the screen cloth and through the openings.

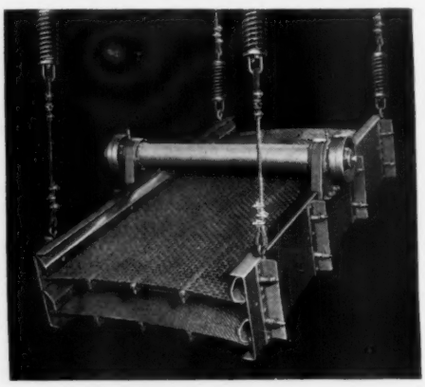
There are four electric vibrators—one at each corner. The two vibrators at the upper or feed end are yoked together by a cross-armature beam. The vibrators at the lower or discharge end are yoked together in the same manner. These armature beams are intensely vibrated and transmit this vibration to the screen-cloth stretching and supporting structure.

The supporting and stretching structure of the Type 400 screen is said to provide a rigid, taut screening surface. The rubber-covered supporting bars will carry any load that is given the screen and hook bolts keep the screen surface in constant tension.

New Vibrating Screens

The Allis-Chalmers Mfg. Co., Milwaukee, Wis., in 1933 brought out the Style B centrifugal vibrating screen which is said to be suitable for sizing practically any wet or dry materials that are sized for commercial purposes. The rapid mechanically-produced eccentric motion of this screen is said to have the same intensity of vibration regardless of the tonnage fed to the screen, making it adaptable for heavy loads and the maximum range of sizes.

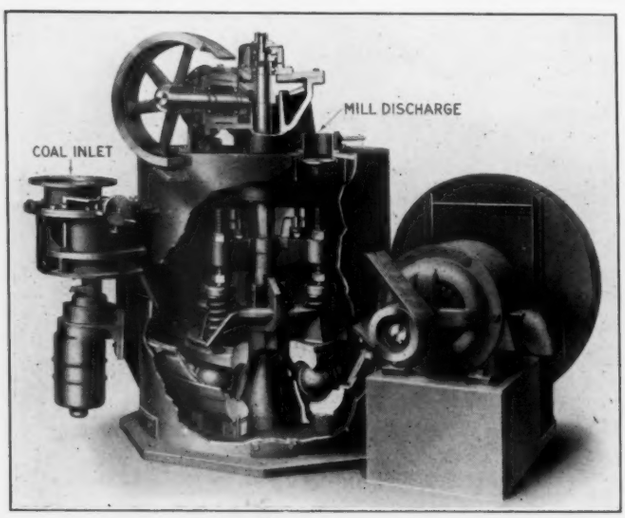
The screen frame is built of two heavy I-beams fastened together by cross ties. The side members support the motor, the frame bearings and the four corner springs which float the body. The screen body consists of two steel side plates reinforced



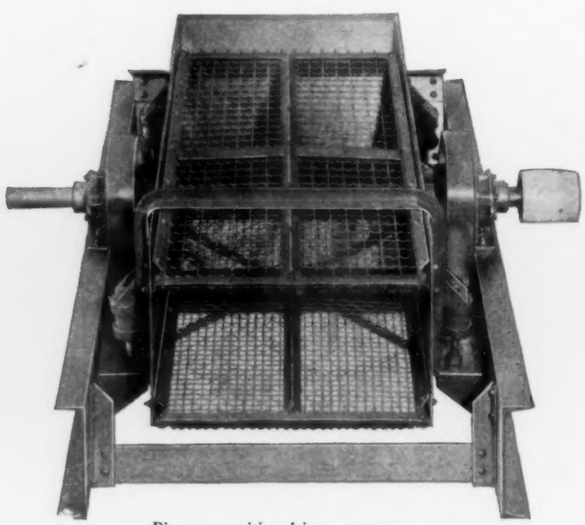
Aero-Vib screen.

inside by longitudinal angles and connected together by cross angles. Because the body is supported on these springs the mechanism can be removed without disturbing the vibrating member.

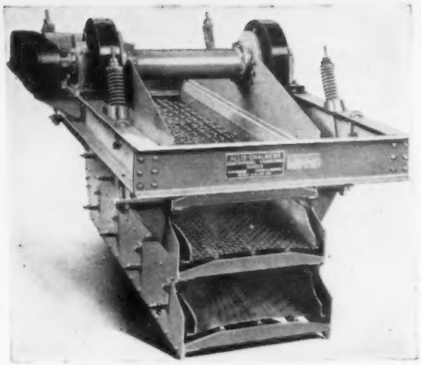
The driving mechanism is a self-contained unit located above the body and



Babcock & Wilcox pulverizer.



Pioneer positive-drive screen.



Allis-Chalmers centrifugal vibrating screen.

supporting frame. The drive shaft is enclosed by a rigid tube which protects the two roller bearings supporting the shaft and also stiffens the body. Two steel plate balance wheels on the shaft are adjustable and are protected by guards. Labyrinth seals also prevent dust from getting into the bearings. Spring and cable suspension of these screens is recommended, but they can be bolted to a supporting structure. These screens are made in all sizes in one, two, or three decks.

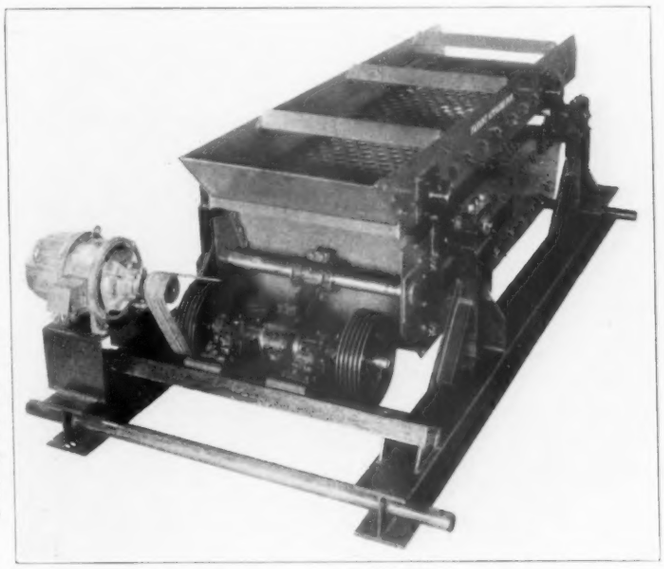
The Aero-Vib screen, which is also a product of the year, was designed for sizing lump and granular substances such as crushed stone, slag, sand and gravel, etc., either wet or dry. This screen has a rapid vibratory motion produced by counterweighted wheels mounted on the drive shaft carried in anti-friction bearings attached to the screen body. The body is suspended from the supporting structure by cables and springs.

The body or vibrating member of this screen consists of two steel side plates reinforced inside by longitudinal angles. They are connected by cross angles which carry the longitudinal screen supports. The vibrating mechanism is a self-contained unit located above the body. The drive shaft bearings are carried in solid steel housings bolted to the screen body and are sealed on the screen side by steel cover plates welded to a pipe connecting the two bearings. The counterweight wheels are each made of two disks the outer of which can be turned to adjust the amplitude of vibration.

New Types of Scrubbers

The Niagara Roller Bearing Screen Co., 40 Pearl St., Buffalo, N. Y., has developed a new line of washing and scrubbing equipment featuring new and interesting principles. The Niagara gyratory tube scrubber embodies an entirely new principle in scrubbing. The trough is actuated by means of an eccentric shaft which gives it a circular or gyratory motion. This motion, acting in one direction, turns or whirls the material in the opposite direction causing it to surge and cascade in a spiral path. The material is said to be alive and turning at all times allowing removal of fines and dirty water.

The Niagara centrifugal sand scrubber and soft-stone breaker accomplishes its scrubbing by means of centrifugal force. The machine consists of a series of horizontal revolving disks provided with scrubbing sections and return baffles to give the material a number of similar treatments before its discharge from the machine. The number of disks required is dependent upon the amount of clay, soft stone, and foreign material to be removed. The water acts as a cushion and, by its regulation it is said that a severe action that will break up soft stone can be obtained. The more water used the greater the cushion and the less breakage of the stone. With very little water it is claimed that a hard, sharp, clean, and cubical stone sand can be obtained.



Hendrick short-throw shaking screen.

A Diaphragm Jig

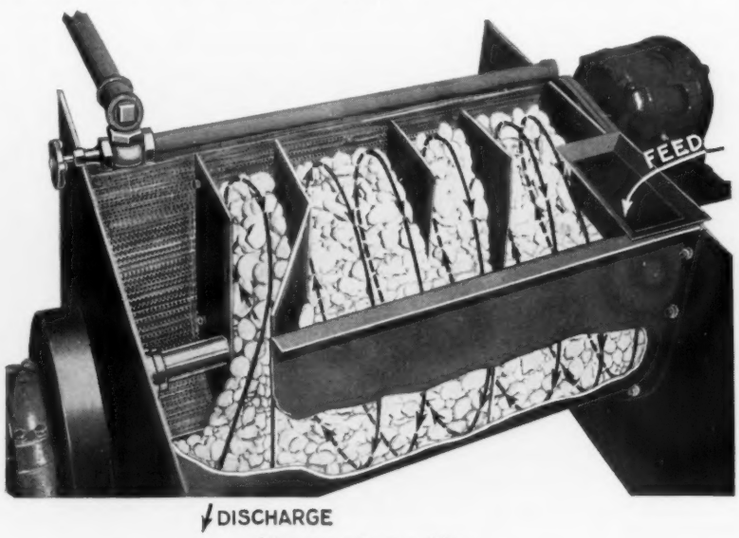
F. N. Bendelari, president of the Consolidated Lead & Zinc Co., Joplin, Mo., developed a diaphragm jig which, it is said, successfully removes shale, lignite, coal, soft stone, etc., from gravel. The advantages claimed for this jig are: high efficiency because of the even action over the whole bed, compactness, and rapid stratification.

These jigs are made in two sizes, one to handle gravel from 1 in. down to ⅜ in. in size, and the other to handle minus ⅜-in. material. They are constructed of ⅜-in. plate and structural steel electrically welded. In this jig diaphragms instead of plungers are used to cause the pulsations. The lineshaft and eccentrics are below the hutches and a tube, extending through each hutch to the plate which carries the diaphragm, makes it possible to connect the eccentric by means of a wrist pin and crosshead without using a stuffing box. Due to this construction the movement of the diaphragm is vertical and the weight of the diaphragm head is carried on the crosshead instead of on the rubber diaphragm, which acts only as a seal.

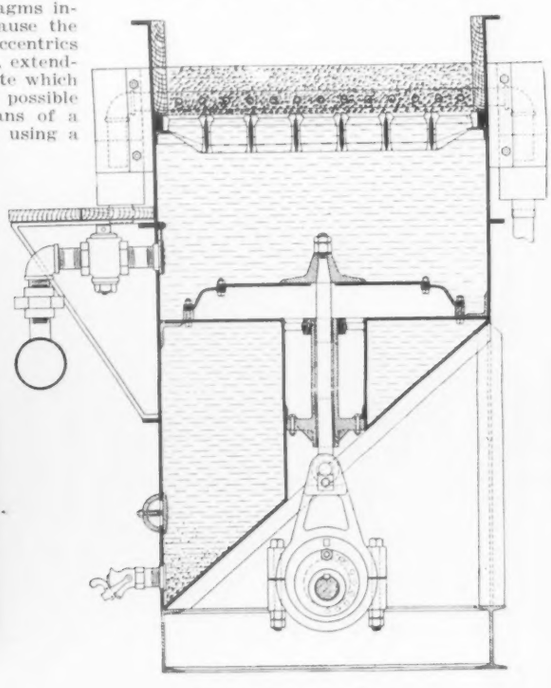
The control valves are interesting. Water from a manifold is admitted below the sieves through check valves on the downstroke of each diaphragm and the amount of water can be regulated while running by means of the control valves. The sieve frames also are unusual in that the webs are stream-lined and touch the sieve cloths only at the intersections of the webs, where the cloths are supported and fastened. This renders practically the whole sieve area effective. Provision is made for lifting the sieve frames without injuring the cloths.

Short-Throw Shaking Screen

The Hendrick Manufacturing Co., Carbondale, Pa., brought out a new short-throw shaking screen which is designed for use in screening all kinds of material. The speed of this shaker is said to be



Niagara gyratory scrubber.



Bendelari diaphragm jig.

somewhat greater than is common in this type of screen. Its speed of 250 to 350 r.p.m., however, is slower than that of vibrating screens. The decks of this screen are balanced and work opposite to each other to eliminate vibration. The only rotating bearings on this screen are on the drive shaft, all others being oscillating bearings, and their movement is so small that they are equipped with oil-less bronze bushings.

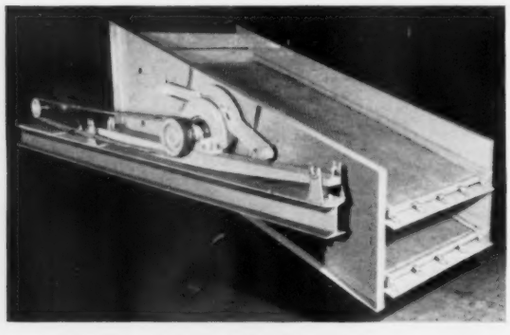
The screen is being made in 2, 3 or 4 decks and there is said to be practically no limit to the size in which it can be made up. The screen works in a horizontal position, no pitch being necessary as the material is moved forward by the action of the screen. It can be mounted on a foundation or hung from overhead girders.

Light-Weight Vibrating Screen

The Stephens-Adamson Mfg. Co., Aurora, Ill., announces a new and somewhat lighter model of their Vibrator screen. The new model is known as the "normal-duty" screen and is built to handle the smaller sizes of materials up to 1½ and 2-in. in size. It is of practically the same design and construction as their heavy-duty Vibrator which has been on the market for several years and is intended for use where the massive construction of the heavy-duty screen is not necessary.

Both models have a number of new features. The screen body is reinforced by stiff tubular cross members, over which the screening panels are stretched. A new type of panel mounting enables the panels to be slipped into multiple sockets at the lower end and stretched by means of malleable clamp levers and tightening screws at the upper end. A new saddle-like stabilizer of cast steel permits a quick adjustment of the screening angle to suit the volume of material being handled. It also enables the whole screen body to be tilted away from the feed spout to facilitate the inspection and changing of panels.

A feature is the cradle-spring mounting, consisting of two semi-elliptic springs on which the two out-board screen bearings are bolted. The action of the springs and suspension shackles are said to effectively insulate the subframe from all vibration—horizontal, and vertical. The new mounting makes it possible to set the screen and subframe directly upon building supports without suspension cables or other shock absorbing equipment. Both the "heavy-duty" and the new "normal-duty" Vibrators are made with 1, 2 or 3 decks and in sizes from 2 by 6-ft. up to 5 by 8-ft.



Vibrator light-weight screen.

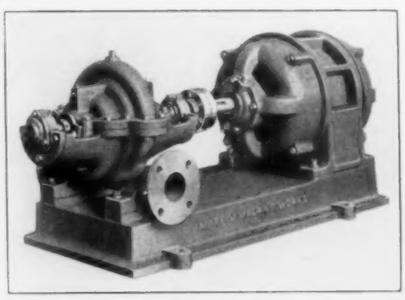
Screen Cleaning Device

The Productive Equipment Corp., Chicago, Ill., brought out an automatic cleaning device for its Jigger vibrating screen. This consists of a brush carriage, driving belts, and a chain-case driving mechanism. The screen cloth is brushed from below in both directions. An electrical timing device allows the number of times the brush is to be operated per hour to be adjusted to operating conditions. This equipment is designed primarily for use where finely-ground limestone, fine silica sand, or other similar product is made.

Another development of the year was the Jigger heavy-duty safety vibrating screen with controlled vibration and circle-throw action. This screen is made of heavy boiler plate, electrically welded, and has a full-floating drive shaft. The vibrators are eccentric rings, completely enclosed and running in oil, the stabilizer of live rubber is a factor in controlled vibration, and the entire machine is mounted on rubber supports. It is claimed that this machine will operate satisfactorily on any wet or dry materials. The standard heavy-duty Jigger is made in sizes from 3 by 6-ft. to 4 by 10-ft. with 1, 2, or 3 decks and from 5 by 8-ft. to 5 by 12-ft. in 1 and 2-deck models.

High-Speed Centrifugal Pumps

The Morris Machine Works, Baldwinsville, N. Y., brought out a new line of double-suction, split-case centrifugal pumps specially designed for operation at high speed. They can be direct connected to electric motors or steam turbines operating at 3500 r.p.m., or may be connected through belt or gears to lower speed power units. They are built in sizes of from 1½ to 5 in.



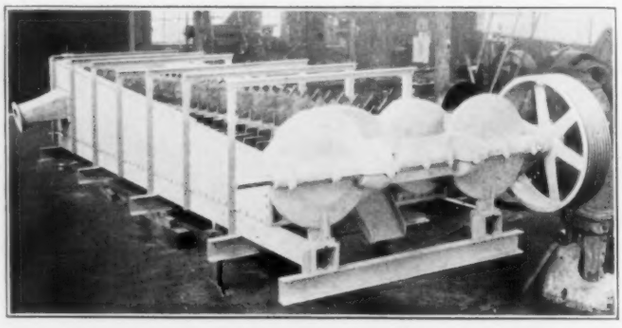
Morris double-suction pump.

These pumps follow in general the standard centrifugal pump design but each element has special provisions to meet high-speed requirements. The impellers, shaft and couplings are first individually tested for perfect rotative balance and then the entire unit is similarly tested before the pump is assembled. The design and finish of the impeller are specially refined to minimize friction and eddy losses. Deep-groove, heavy-duty precision ball bearings are used on each side of the pump.

Electric Welded Log Washer

The McLanahan & Stone Corp., Hollidaysburg, Pa., developed a new log-washer which incorporates all of the many improvements resulting from their 50 years of experience in the manufacture of this type of equipment. This washer has electrically-welded square logs with easily removable and interchangeable Macmetal paddle tips. The location and arrangement of these paddles is also new. The heavy split ball and socket log bearings with split bronze bushings are adjustable and reversible and are all fixed in one housing. Each log is driven separately by gears running in oil. Alemite lubrication is used.

It is claimed that this new log-washer has a greater capacity and produces a cleaner product than previous models, with lower power consumption and minimum water requirements. These log-washers can be obtained with V-belt, gear reduction, or flat belt drive, as desired and are made in different lengths and sizes.

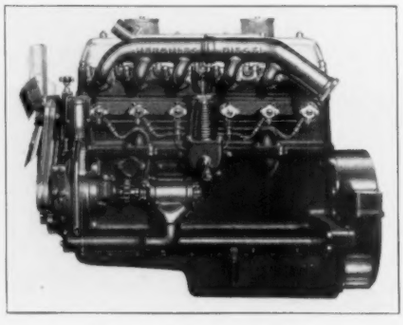


New McLanahan log washer.

Internal-Combushion Engines

Gasoline and Diesel Engines

The Hercules Motors Corp., Canton, O., in 1933 developed a small 4-cyl. series of gasoline engines known as the "ZX" series. The individual engines are known as "ZXA," 2½ by 3-in., 58.8 cu.in. displacement and the "ZXB," 2⅝ by 3-in., 64.9 cu.in. displacement. In this series the entire unit is supported on a combination of oil pan and base, eliminating the use of feet on the flywheel housing or separate front support. The fan is mounted directly on the crankshaft, eliminating the use of fan belts and the conventional fan assembly. The radiator core is bolted directly to the cylinder head to permit the use of a large top tank and large inlet and outlet openings. The lower part of the radiator core is bolted directly to the sub-base which supports the entire unit. The engine may be equipped with the various standard accessories such as governor, fuel pump, magneto or distributor, air cleaner and it also has a removable bell-housing.



Hercules 6-cylinder Diesel.

In 1933 the company also placed in production the new DXI Diesel engine which is a 6-cyl., 5 by 6-in. engine of 707-cu.in. displacement. The crankshaft used in this engine is a drop forging of chrome nickel molybdenum steel and is drilled for lubrication of the crank pin bearings and provided with an oil seal at the flywheel end. An oil thrower seals the forward end of the crankcase and further protection against loss of oil and ingress of dust and dirt is afforded by a cork and felt seal ring clamped in place in the trunnion on the gear cover. Connecting rods are H section drop forged and rifle drilled to carry oil to the piston pin and are chrome

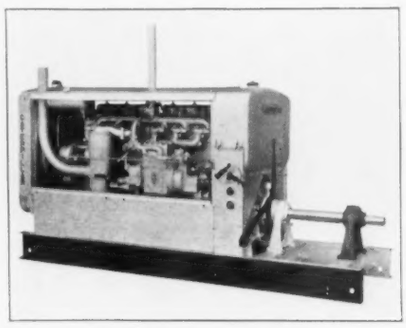
nickel molybdenum steel. The crankcase supports the one-piece cylinder block to which are secured two cylinder head castings, covering three cylinders. Cylinders are provided with liners of the "wet sleeve" type made of electric-furnace molybdenum iron. The fuel pump drive is by silent chain from the camshaft gear and is of the "in line plunger type."

The cooling fan is driven from a pulley on the water pump shaft and the air compressor for use with air brakes is driven by the same belt. Pistons are aluminum alloy provided with four compression rings and two oil-drain rings, one oil ring above and one below the piston pin. Lubrication is accomplished by means of a double scavenging pump.

The engine employs overhead valves which are actuated by drop-forged rocker arms drilled for valve-stem lubrication and mounted on a hollow hardened and ground shaft held in brackets and mounted to the cylinder head. Drilled holes lead oil to these hollow rocker arm shafts for all overhead lubrication, the drain back being around the push rods and back to the crankcase.

Diesel Power Units

The Caterpillar Tractor Co., Peoria, Ill., has made available as power units for stationary, portable and semi-portable work the engines used in the seven largest sizes of Caterpillar tractors. Four of these are gasoline engines and three are Diesels. The Diesel engines are those used in the



Caterpillar Diesel power unit.

Diesel Seventy Five, Diesel Fifty and Diesel Thirty Five caterpillar tractors and are known as the D 11,000, D 7700 and D 6100 Power Units. They develop, respectively, 102, 63 and 47 maximum brake hp.

A high degree of standardization has been secured in these Diesel power units. They are of the 4-cycle, pre-combustion chamber, solid-injection type with separate fuel injection pumps for each cylinder. They have 5¼ in. bore by 8 in. stroke and use the same cylinder liners, pistons, wrist pins, connecting rods, main bearings, fuel pumps, injection valves, pre-combustion chambers, timing gears and starting engine. This not only results in manufacturing economies, but simplifies dealers' and owners' parts stocks and field servicing of the machines. The principal difference in the three engines is the number of cylinders—the D 11,000 has six cylinders, the D 7700 four, and the D 6100 has three. They operate on a wide range of low-cost fuel oils.

A 2-cyl., 4-cycle gasoline engine cranks the Diesel engine through a chain of gears engaging the flywheel.

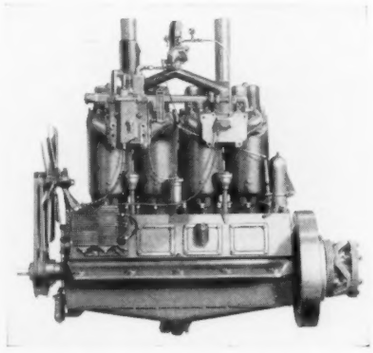
Fuel injection pumps are mounted in a separate case on the right side of the engine where they are completely protected, but are easily accessible. An air cleaner is provided on each engine and all lubricating and fuel oil is forced through special filters under constant pressure. Full force-feed lubrication is provided to main, connecting rod, wrist pin, valve rocker arm and front camshaft bearings. Cooling temperatures are controlled by thermostats and fans are driven by enclosed gears, running in oil.

In addition to the three Caterpillar Diesel power units, there are three new gasoline power units in the Caterpillar line employing the engines used in the Seventy, Fifty and Thirty Five tractors. These power units are known as the 9500 G, 7500 G, and 6000 G. The 9500 G engine has a 7-in. bore and 8½-in. stroke and develops 96 maximum brake hp. Engine 7500 G has 5½-in. bore and 6½-in. stroke and develops 63 hp., while engine 6000 G has 4⅞-in. bore and 6½-in. stroke and develops 47 hp. A fourth Caterpillar gasoline power unit, known as the 5500 G, is also available with a bore and stroke of 4½ in. and 5½ in. and all four of these engines may be equipped to burn natural gas.

An Oil-Burning Engine

The Northwest Engineering Co., Chicago, Ill., brought out a new oil engine that burns the lighter distillates known in various parts of the country as No. 1 furnace or stove oil, No. 1 engine or tractor distillate, etc. This engine is of the heavy-duty type, operating at slow speeds and is said to possess the torque characteristics and hanging-on qualities desirable for shovel, crane and dragline service.

This engine has no moving parts other than those found in a gasoline engine, is started by cranking and is said to have

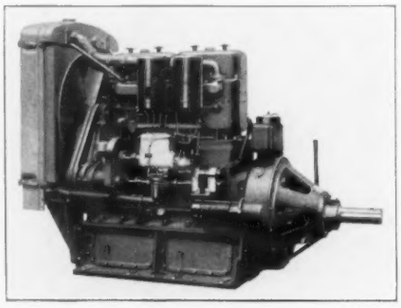


The Northwest oil engine.

pressures not exceeding those in a gasoline engine. It has an ignition system and a carburetor and the special combustion chamber and manifold design results in the heavy fuel oil reaching the cylinder in practically the same condition as gasoline. According to the manufacturers the fuel conversion system meters the fuel accurately to the engine, atomizes it finely into the air stream, and distributes it accurately to each of the four cylinders.

Heavy-Duty Oil Engines

The contribution of the Waukesha Motor Co., Waukesha, Wis., to the field during the year consisted of the development of a series of 8 sizes of Waukesha-Hesselman oil engines for general heavy-duty industrial service. The sizes are: 25, 35, 50, 70, 95, 125, 150, and 175 hp. The three larger units have 6 cylinders and the others 4 cylinders. It is claimed that these engines will burn any fuel that can be burned in a Diesel engine and some



Waukesha-Hesselman engine.

that can not. Even alcohol and gasoline mixtures can be used.

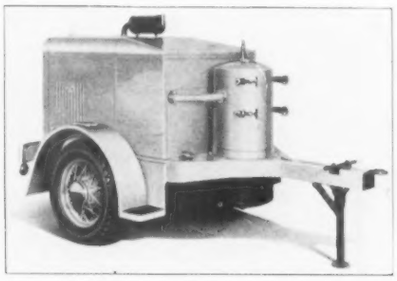
A pump circulation cooling system with free-flow radiator is used and lubrication is by force feed to all main, connecting rod, piston pin, and camshaft bearings. Oil filters are standard equipment as are also a fuel oil filter and a Bosch fuel injection pump. Cylinder heads are detachable with valves and rocker arms, and the cylinders are of truncated design cast in pairs of Waukesha alloy iron.

Compressed-Air Machinery

Portable Gasoline Compressor

The Amplex Mfg. Co. Division of the Chrysler Motors Corp., Detroit, Mich., developed a new portable compressor with many unique features. The unit consists of a special 4-cyl. air compressor, belt driven by a Chrysler 4-cyl. industrial engine, with two radiators, air tank and accessories mounted on a rigid frame and carried on two rubber-tired wheels. Other features of this unit are its high volumetric efficiency of 88 per cent. at the normal operating speed of 1200 r.p.m., the reduced compression ratio which lowers the temperature of the delivered air, and the governor which operates the compressor at speeds in proportion to the demand for air.

A belt drive is used from the engine to



Chrysler-Amplex compressor.

eliminate all shock and the compressor is made up largely of parts common to the engine, making for interchangeability of parts. These units are made with the same high productive machine and tool equipment of the automotive divisions of the company. Both the engine and the compressor have four cylinders cast in block integral with the crankcase and with a displacement of 196 cu. in. Forced feed lubrication is supplied by a gear-type oil pump and aluminum pistons of slotted skirt design are used. The compressor governor is Chrysler designed and is pressure controlled, with a throttle on the intake manifold.

Hand-Held Air-Drill

The Sullivan Machinery Co., Chicago, Ill., added to its line two recently developed hammer drills, the Class "L-2" and held machines, built in Class "L-4" hand hollow piston, air tube and water tube types. The "L-2" is also available in the solid piston type.

Sullivan air drill.

The "L-2" is said to be suitable for a wide range of drilling work, from light drilling such as block holing in secondary shooting in quarries to bench drilling and other fairly heavy drilling jobs in open cut excavations. Automatic rifle bar rotation is employed. The drill steel is held in place in the chuck by a steel coil spring retainer, secured by locks on each side of the drop-forged chuck housing. The entire drill is lubricated from an oil reservoir situated in a boss in the side of the cylinder. The customary double-grip han-

dle, with two rubber hand grips, is employed.

The "L-4" is a medium-weight sinker 25½ in. long with large double rubber grip handles. It is equipped with spring-type retainer and chuck parts to use 1 by 4¼-in. hexagon collared shank steel and uses 1-in. air hose. Lubrication is provided by means of a line oiler in the air supply hose.

Large Wagon Drill

The Gardner-Denver Co., Quincy, Ill., announced the WD2 wagon drill which will handle 3½ and 4-in. drill steel and will drill to depths of 30 and 35 feet. The WD2 wagon is constructed of I-beams, channels and angles. The heavy square axle is offset, carrying the wheels far enough forward to eliminate danger of upsetting when pulling a tight steel. The one-piece cast slide to which the drill is bolted takes any size drill.

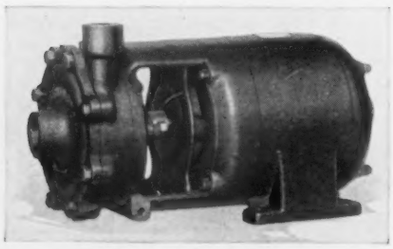
A quick-acting centralizer is said to make spotting on rough ground easier and the air hoist throttle and blowing controls are within easy reach of the operator. When extra long steels are used the

Gardner-Denver wagon drill.

outfit can be equipped with a hand winch with cable and steel puller for raising and lowering the steels and with an extension and guide for handling them. This drill has a maximum possible steel change of 11 feet.

Rotary Air Compressors

The Allis-Chalmers Mfg. Co., Milwaukee, Wis., announced a new line of rotary air compressors of the multi-cellular, sliding-vane type, in both water and air-cooled designs. This line covers a range of volumes from 50 to 2,000 c.f.m. at pressures up to 150 lb. and vacuums up to 29.85 in. mercury. The air-cooled units are suitable for pressures up to 10 lb. G., and the vacuums up to 18 in. Hg, and the water-cooled units for higher pressures and vacuums.



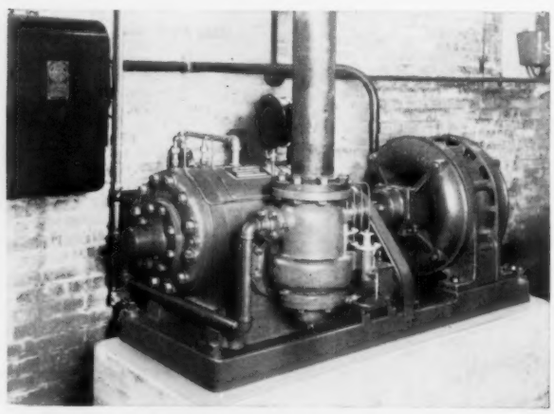
Worthington Monobloc pump.

Detachable rock-drill bit.

Advantages claimed for these units are smooth operation, small dimensions, continuous delivery and absence of maintenance requirements. No belts or pulleys are normally required as the units operate at standard motor speeds. Their design is extremely simple, involving no valves or complicated motions, and all working parts are totally enclosed but easily accessible.

High-Speed Centrifugal Pumps

The Worthington Pump & Machinery Co., Harrison, N. J., improved and added to many of its lines of compressors and centrifugal pumps. The line of 2-stage Monobloc centrifugal pumps was a notable addition. These units are said to have no more parts than a single-stage unit. The impeller furnished with this pump is of unit construction consisting of two enclosed-type impellers back to back. The impeller is of bronze on the G and GB types and of cast iron on the GA type. The impeller is keyed and held to the shaft by an impeller lock nut and the shaft sleeve, also keyed, is separate from the impeller and is renewable. These pumps will operate satisfactorily either horizontally or vertically.



Allis-Chalmers rotary air-compressor.

Detachable Drill Bits

The Ingersoll-Rand Co., New York, N. Y., announced the new Jackbits which are detachable rock drill bits designed to replace the conventional bits forged on the ends of drill steels. They are secured directly to the end of the drill rod by means of a sturdy, shallow, reverse buttress-type thread of a carefully determined angle. This distinctive thread is said to keep the bit tight while in use and make it easily detachable for changing. The maximum hammer blow is transmitted through the end of the rod, close to the cutting edge, and there is no pressure on the threads.

Other features are large clearance grooves to pass cuttings from the bottom of the hole, a counter-sunk hole in the center of the cutting edge which acts as a pilot to guide the bit, and cadmium plating to prevent rusting and to give a bright finish which minimizes the loss of bits.

Other Equipment

Belt Training Idlers

The Robins Conveying Belt Co., New York, N. Y., in 1933 brought out a training trougher idler which automatically trains the upper or loaded strand of a belt conveyor and a belt training return idler to make the return belt run straight even if caked with sticky material.

The training trougher is said to be automatic and instantaneous in its action. If the belt starts to run off to one side, its edge touches one of the two side rollers, instantly applying a brake to the idler end pulley. This causes a slight momentary drag on that side which swings the whole idler about its central vertical pivot, thus steering the belt back to its normal central position.

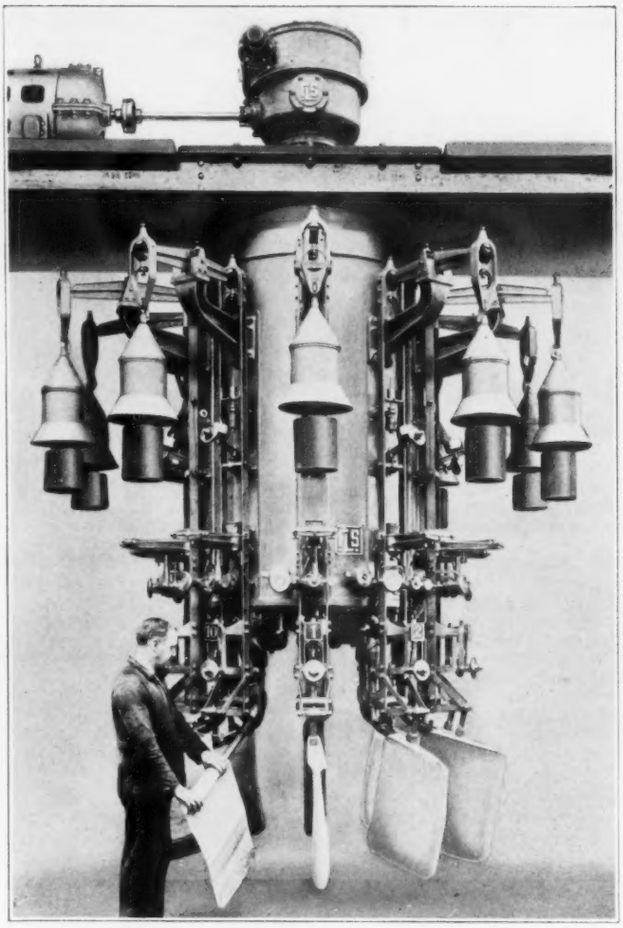
The idler is of standard roller-bearing construction, with labyrinth and cork washer grease seals, high-pressure lubrication, narrow gaps between pulleys, and a base of substantial design. The end rollers are mounted on anti-friction bearings and special pivoted brackets, the lower ends of which carry the asbestos brake blocks. The training trougher is offered in sizes for all standard belt widths.

The return belt-training idler consists of a tubular roller centrally-mounted on a single anti-friction bearing internally-pivoted on a fixed swivel pin located on the center line of the conveyor and inclined forward about 30 deg.

When the weight of the belt falls more on one side of the pivot than on the other the roller rocks downward on the heavy side. At the same time, due to the inclination of the swivel pin, the roller becomes skewed with relation to the belt and causes it to move back to the conveyor center line. It is made for all standard belt widths up to 60-in. and is interchangeable with Robins standard return idlers.

Rotary Weighing Bag Packer

One of the developments made by F. L. Smidth & Co., New York, N. Y., was the rotary Fluxo bag packer which is designed for the automatic packing and weighing of cement, ground lime, ground phosphates, soda ash, and similar material into valve bags. This packer consists of a cylindrical supply tank on which filling spouts with associated weighing mechanisms are mounted. This tank rotates slowly about its axis and the starting and interrupting of the flow of cement to the bags, as well as the discharge of the filled bags, is entirely automatic. The attendant merely slips a bag packer is furnished in various sizes with on each filling spout as it passes him. This varying numbers of filling spouts according to the capacity desired. It is claimed that a packer with 12 spouts can pack from 1500 to 1600 bags of standard Portland cement per hour with only one man in attendance.



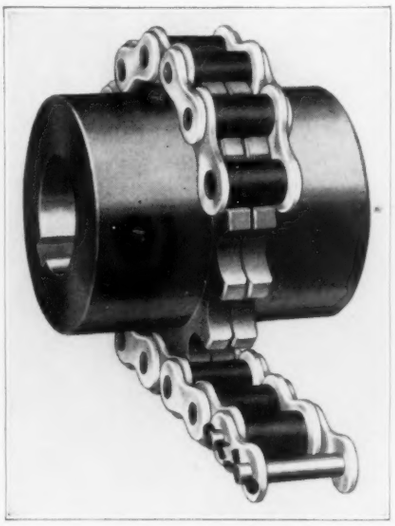
Above: Ottumwa box-car loader designed for handling material in bags.
Left: Fluxo rotary bag packer which weighs automatically as it packs.

Roller Chain Coupling

The Link-Belt Co., Indianapolis, Ind., brought out the new "RC" flexible coupling using the company's Silver-link roller-chain. This coupling consists of two cut-tooth sprocket wheels and a piece of roller-chain to connect them. A pin-and-cotter link makes it easy to couple or remove the chain when desired. Where protection from dust, dirt or other conditions is advisable, the coupling can be inclosed in either a stationary or revolving automatically-lubricating oil-retaining casing.

Box Car Loader

The Ottumwa Iron Works, Ottumwa, Ia., developed a new sack or package box-car-loader which consists of a 4-wheeled running gear carrying 3 power-operated conveyors mounted one above the other. The uppermost or receiving conveyor is mounted on a platform that can be moved endwise along the frame of the machine or turned around to feed in the other direction. The middle conveyor is fixed to the machine and the bottom conveyor can be pulled out lengthwise to reach the far end of the car being loaded. The bottom conveyor is supported by a 2-caster truck and is moved by a hand crank. The other two conveyors are driven by the same electric motor, and the receiving conveyor by a separate reversible motor. The entire machine is made of aluminum alloy metal and is light enough to be moved by one man. In operation the conveyors can be gradually telescoped as loading progresses and the machine then turned about to load the other end of the car. This machine is said to be able to handle 2,000 sacks per hr. weighing up to 140 lb. each.



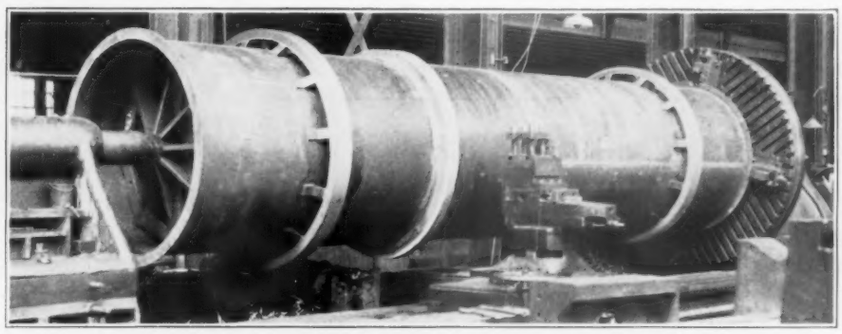
Link-Belt coupling.

Improved Rotary Drier

The Allis-Chalmers Mfg. Co., Milwaukee, Wisc., in 1933 made a number of coolers, driers, tube mills, etc., built to meet requirements. Among these was a 5 by 25-ft. drier shell which was constructed of four plates with two longitudinal and one circumferential joint. The ends of the shell are reinforced by bars rolled on end and welded to the shell. Riding rings are welded and secured to the shell by a forged steel bracket. The drive sprocket flange consists of two angles, one welded to the shell and the other bolted to the shell angle. Not a single rivet was used in the construction of the shell riding rings and sprocket flange. To insure accurate alignment the assembled unit was placed in a lathe to permit machining the riding rings and sprocket supporting angles.

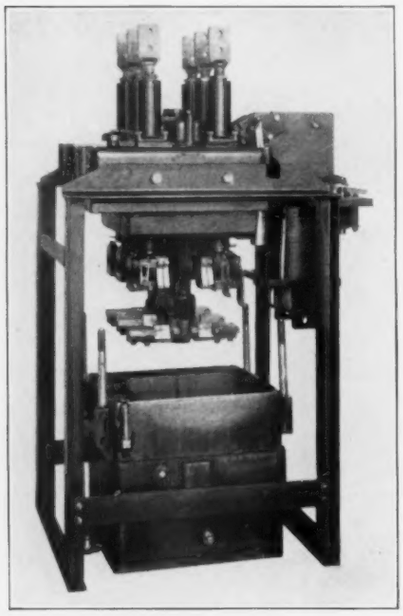
Synchronous Motor Controllers

The General Electric Co., Schenectady, N. Y., made many improvements and additions to its line, including a new series of synchronous motor controllers which supersedes all of the old standard lines. A new relay is provided which automatically applies field excitation when the motor reaches a predetermined speed near synchronism. Another relay automatically removes field excitation when the motor drops out of synchronism. These con-



Allis-Chalmers rotary drier.

trollers are also provided with a two-element temperature relay for protecting the stator windings and a temperature squirrel-cage protective relay to protect the amortisseur windings under all operating conditions. A new Telechron motor-



General Electric circuit-breaker.

operated timing relay is also used to initiate the transfer from starting to running connections on reduced voltage and part-winding controllers.

A new oil-blast circuit breaker, Type FK-44B-Y1, was developed which, it is claimed, will withstand 10,000 open-close-open operations at 1200 amp., 2300 volts without requiring any maintenance. The breaker is of single-tank construction suitable for mounting on open or in enclosed frameworks.

A new line of rectangular switchboard instruments was also announced for which it is claimed that the scale can be read at any angle without parallax. Antiglare glass and magnetic damping are other features. This line, designated as Types AD-6 and DD-6, includes alternating-current voltmeters, ammeters, wattmeters, power-factor meters, frequency meters, direct-current ammeters and voltmeters.

Geared and Fan-Cooled Motors

Among the new equipment brought out by the Westinghouse Lamp Co., Bloomfield, N. J., was a new mercury switch which is refractory protected to confine the arc and to obtain long life with dependability. This switch is made with nominal ratings from 3 amp. to 50 amp. and may be operated in either a. c. or d. c. circuits.

The contact in this switch is made by an impact between two pools of mercury within a refractory chamber encased in heavy glass walls. Instead of flowing together the mercury from one pool drops to meet the other with a sudden visible jump. An atmosphere of inert gas within the chamber keeps the mercury chemically pure and prevents the loss of fluidity that causes it to become gummy and slow flowing. These switches have flexible leads and special mounting clips are available to facilitate installation.

The Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., also brought out many items of interest among which was the improved fan-cooled motor. Gearmotors also were developed. All of these motors have heavy cast frames to insure rigidity and accurate alignment of parts and the dual insulation on the windings gives added protection from dust and atmospheric conditions. Anti-friction bear-

Westinghouse mercury switch.

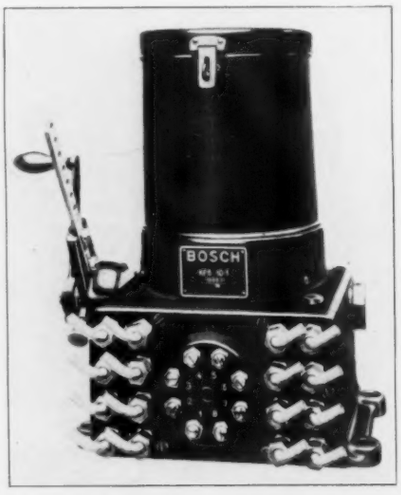
ings and helical steel gears and pinions are used, the latter being the same as those used by the company in industrial gears and speed reducers for many years.

Force-Feed Grease Lubricator

The United American Bosch Corp., Springfield, Mass., manufactures a complete line of automatic positive forced-feed grease lubricators for all types of machinery. The "k" types are specially designed for machinery in cement mills, mines and other nonmetallic-mineral operations.

These lubricators are of simple and rugged construction, consisting of two main parts—a cylindrical tank, which serves as a container for the grease, the scoop and the helical disk feeder, and the box-shaped cast-iron base which houses the entire pump system with its drive mechanism. The pumping mechanism is identical with that of the Bosch forced-feed oil lubricator, consisting of concentrically-arranged pump units and the pump shaft with its two disk cams which actuate the pump plungers and the grease-guide plungers.

The lubricator drive-shaft can be driven from any suitable moving part of the machine to which it is applied, and these lubricators are built with various ratios between. All the working parts are com-



Bosch automatic lubricator.

pletely inclosed, are easily accessible, self-lubricating, and require very little power.

The rate of feed is controlled also by the adjustment of the individual pump unit. Where it is required that a varying quantity of grease be delivered to the different lubricating points, each pump unit can be adjusted independently.

Efficient New Respirator

The Chicago Eye Shield Co., Chicago, Ill., developed a new "Healthguard Mask," known as Style No. 601. This mask, which is rated over 99 per cent. efficient, was designed primarily for sand-blasting and other occupations where harmful dusts are encountered. The mask consists of a soft moulded rubber facepiece designed to adapt itself to any facial contour and when in position the interior is entirely sealed against outside air. A moulded rubber head harness, fitted with detachable and adjustable buckles holds the mask in position.

A moulded rubber tube attached to the side of the facepiece permits free movement of the head and connects with the air filter which is attached to an adjustable belt. A quick-acting coupling connects the filter to the air supply. Air under pressure enters the filter where a cartridge removes foreign particles and odors. The volume of air is regulated by an adjustable control valve and an automatic relief valve eliminates excessive pressure. Air entering the facepiece is broken up by a baffle and exhaled air is released by means of a positive exhaust valve. When in operation the facepiece is completely covered by an outer hood with large lenses and a perforated metal screen.

Recording and Control Instruments

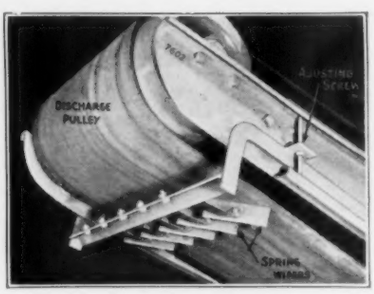
Among the developments of the Bristol Co., Waterbury, Conn., were improved pressure gauges, temperature controllers, indicating pyrometers, recorder controllers, pyrometer controllers, Syncro valve,

Bristol electric pyrometer.

etc. The Model 420-C indicating electric pyrometer is equipped with a rotary switch and permits checking temperatures from 1 to 12 points. On the extra-wide scale which is a feature of this instrument readings are clearly visible at a glance. This instrument is made with temperature ranges up to 3,000 deg. F., is housed in a moisture-proof, black-finished aluminum case, and has a 2-pointer knob for minimum angle of rotation.

Efficient Belt Cleaner

The Stephens-Adamson Mfg. Co. of Aurora, Ill., developed a new belt-cleaning device. The cleaner is placed just back of



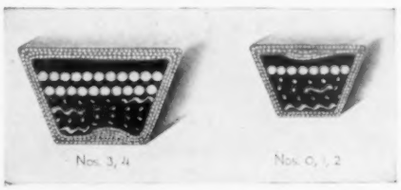
S-A belt-cleaner.

the discharge point on the return run of the belt. It consists of a row of thin spring-steel plates set perpendicular to the surface of the belt, but diagonal to the belt travel. Each plate is mounted on an individual spring which presses it firmly against the belt. The connection to the spring is by a pivot which insures that the plate will seat itself perfectly against the belt. As the dirty belt surface moves past the plates, the adhering materials are neatly plowed off. Every particle follows a definite path from the belt surface, across the face of the cleaner plate, and down into the discharge chute, and the movement is continuous so that there is no bunching up or clogging at any point.

Improved V-Belt Drives

The Worthington Pump & Machinery Corp., Harrison, N. J., brought out a new and improved type of Goodyear Emerald Cord V-Belt in connection with the Worthington Multiple-V-Drive. Two variations are used in the new construction. Nos. 0, 1 and 2 have one endless cord in one plane, and Nos. 3 and 4 have two endless cords in two planes. All cords are completely embedded in rubber and the tension and compression sections of the belt are also of rubber, with layers of fabric distributed through the compression section to prevent excessive flexibility.

The belt is molded to shape and is completely enclosed in a fabric envelope which is cut on the bias to prevent it from taking any of the load. This new design is said to produce a greatly improved belt flexing capacity and to result in a longer life. A more accurate matching of the belts in each drive is also claimed due to the closer standardization of the stretch characteristics of the individual belts.



Worthington V-belt drives.

Diesel-Driven Generator

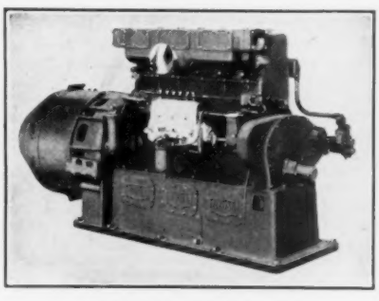
The latest development of the Buda Co., Harvey, Ill., is a light and compact Diesel generating set which is claimed to produce current at approximately ¾ to 1 cent per kilowatt. These sets range in size from 10 to 90 kw., alternating and direct current. The engine is of the solid-injection type with the "shock-absorber" head which is said to cushion the shocks and make for smoother and quieter operation. Renewable cylinder liners, replaceable valve seats, and silichrome steel valves are other features. Electric starting is standard.

A small compact generator set fitted with a natural gas or gasoline engine of similar design was also put on the market during the year, ranging in size from 5 to 75 kw.

Wear-Resisting Metal

During the past year The Babcock & Wilcox Co., New York, N. Y., developed Elverite B, a chilled, cast, alloy iron said to be of exceptional hardness and strength. It was developed for wear-resisting parts in pulverizers, crushers, stamp mills, conveyors, and other similar equipment. It is available for nearly all castings commonly made of chilled iron and alloy or manganese steel. It is claimed to be superior to these materials in resistance to abrasive wear because of its hardness and structure.

Elverite B is recommended by the makers for all parts where abrasion is most severe or where chilled iron requires frequent renewal because of breakage. All parts regularly made of alloy and manganese steels can be made of Elverite B, except in a few cases where the full strength of steel castings is required. The tensile strength of Elverite B is said to be, on the average, 60 per cent. greater than that of ordinary chilled iron and to offer better resistance to shock and load. It is not recommended, however, for applications where the shock is extreme or where strength qualities equal to manganese steel are required.



A Diesel generating set.

Side-Discharge Truck Mixer

The Jaeger Machine Co., Columbus, O., during the year put on the market a new type of side-discharge truck mixer and agitator designed for slab, widening, apron, bridge, curb and gutter, sewer and sidewalk work. This type of mixer, known as the "Road Builder", is built in 1½, 2½, 3½, and 5-cu.yd. capacities. It can also be mounted on a trailer.

The mixer drum is mounted transversely on the truck frame and is rotated by a separate engine drive to the transmission which has a single-lever control for mixing and discharging. These mixers are also made to discharge from either side by merely changing the door, the interchangeable ends of the discharge blades and the water line.

Although designed primarily for strut paving highway work this mixer also has advantages for ordinary commercial concrete work as it is never necessary to back up the truck to load or discharge.

Bituminous and Portable Plants

Plant Impregnates Rock

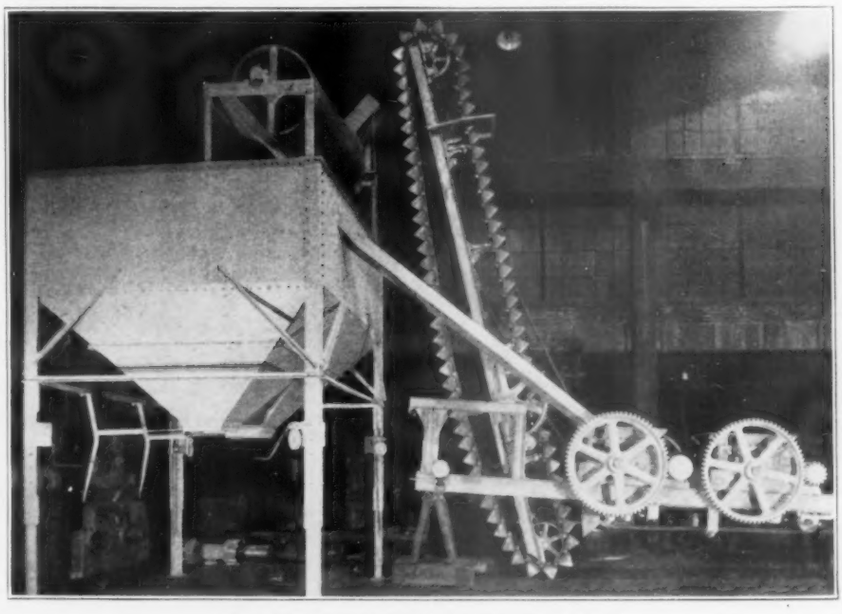
The Heedicsite Co., Grand Rapids, Mich., developed a method and system of mechanical apparatus for bituminizing mineral aggregate which, it is claimed, thoroughly impregnates the aggregate and makes it permanently water-proof. It is the intention of the company to have these plants operated by aggregate producers at their sources of supply. The system used was designed to be automatic and as free as possible from human error and to be able to operate continuously once the proper percentages of ingredients have been selected. Simplicity of operation and low cost were other considerations.

The equipment consists of a rotary drier and agitator to which the aggregate is fed by a bucket-elevator. The drier has an elongated combustion chamber, a double oil-burner, and a draft fan. It dries the stone and discharges it to an inclined single-deck vibrating screen which has three sizes of openings. The three sizes of screen cloth are in separate removable sections allowing the screens to be adjusted to meet local conditions. The three sizes of aggregate are discharged to the three separate compartments of a small feed or surge hopper. These compartments discharge through adjustable gates to a short aggregate-measuring belt-conveyor, thus eliminating any possibility of segregation in handling. As the aggregate, already slightly cooled, drops from this conveyor to the 15-ft. long mixer or pug-mill it is exposed to a stream of cold asphaltic bitumen which issues from a rotary valve and quickly cools the aggregate, expelling the gaseous ether. At the approximate center of the pug-mill a stream of hot asphalt at a temperature of about 300 deg. F. is directed on the mixture from another valve. The last half of the pug-mill is inclosed by a steam jacket which keeps it at a temperature of about 300 deg. F. As a result, the aggregate particles again expand and the vacuum formed in the interstices, together with the atmospheric pressure, impregnates them thoroughly with bitumen.

Each valve is of the automatic-measuring and forcible-ejection type and each is supplied from a separate source. The pug-mill discharges to a 30-ft. portable inclined flight-conveyor which loads trucks or cars for shipment. The plant is said to have a capacity of 40 tons per hr. and has an overall length of 80 ft. and an over-all width of 25 ft. All operating units are driven through chains and sprockets by a single electric motor, internal-combustion engine, or other power source.

Portable Crushing Plant

The McLanahan & Stone Corp., Hollidaysburg, Pa., entered the portable plant



McLanahan portable crushing-and-screening plant.

field in 1933 with a plant assembled from equipment made by the company. In this plant the material feeds to a primary crusher, the product dropping to a roller-bearing troughed main conveyor. A steel chute feeds to a continuous bucket elevator with welded buckets on welded links, which in turn discharges to a 39-in. by 8-ft., single-shell revolving screen. The undersize goes into a 25-ton capacity steel bin with bottom-discharge gates. The oversize from the screen can be fed back through a steel chute to a fluted segment roll secondary crusher which in turn discharges its product to the main conveyor, forming a closed circuit.

The entire plant can be driven from either crusher flywheel pulley. Heavy roller chain drives one crusher from the other, and the conveyor and elevator are chain-driven from the secondary crusher shaft. The screen is driven from the head pulley of the elevator. A 60-hp. motor, either steam, Diesel or electric, drives the entire plant which is said to have a capacity of 40 to 60 tons per hr. of 2½-in. rock.

Portable Asphalt Plant

The Iowa Mfg. Co., Cedar Rapids, Ia., in 1933 developed a batch-type portable asphalt plant to meet the growing demand for this equipment. The material, in order, consists of a small feed hopper from which a feeder discharges to a short conveyor. This in turn discharges to the drier unit which consists of a 60-in. diameter rotary drier mounted on cast steel trunnions with Timken bearings. A 15,000-cu. ft. capacity exhaust fan, a 60-hp. industrial-type gasoline engine, and burners form the balance of this unit. The truck on which this unit is mounted is of steel-riveted and electric welded construction with steel disk wheels and dual Goodyear solid cushion tires.

The drier discharges to a 27-ft. semi-inclosed bucket elevator which discharges the dried aggregate to a 48-in. by 9-ft. revolving screen with fine sand jackets. The storage hopper under this screen has a capacity of 16 tons with 1 to 4 compartments as desired. Any accepted make of aggregate batcher may be furnished with a capacity of 32 cu. ft. for coarse and 19 cu. ft. for fine aggregate. The asphalt weigh batcher has a capacity of 600 lb. and is furnished with a Fairbanks Morse beam scale. Steam or rotary pumps are supplied. The pug mill is of the twin shaft type, manganese-lined, and with steam-operated gates.

The Iowa Mfg. Co., Iowa City, Ia., in 1933 developed several different types of portable straight-line, one-piece, "All-Purpose" aggregate plants equipped with vibrating screens. Primarily designed as sand and gravel plants, a primary breaker and short conveyor on trucks can be added to make them suitable for rock production. Any of these plants can also be adapted to any kind of feed.

The No. 936 outfit consists of a 9 by 36-in. jaw crusher, a 3 by 8-ft., 3-deck Niagara vibrating screen, a 3-cu. yd. charging hopper with built-in grizzly, 24-in. feed and delivery conveyors, 18-in. rejection conveyor. The delivery conveyor is hinged and is swung back out of the way when moving the plant. Heavy-duty roller-bearing steel wheels with Goodyear solid tires are furnished. When ready for operation four screw jacks attached to the under part of the truck are used to level up the unit.

Madsen-Blaw-Knox asphalt plant.

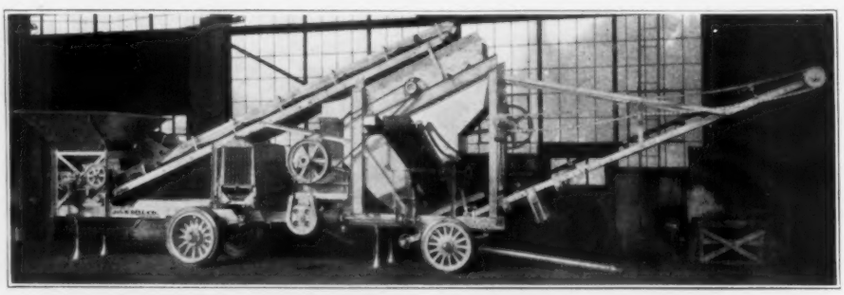
Another type of unit varies from the above only in that the delivery conveyor discharges in a straight line with the flow of the material through the plant. Power is applied to a shaft through a universal coupling on the side of the plant and drives the crusher flywheel by means of a V-belt drive. The rejects are carried back over the screen by a bucket elevator instead of a belt conveyor.

The Tandem (936 and 336) outfit was designed for use where a large amount of crushing is required. Crushers consist of the regular 936 unit and in addition the Cedar Rapids 3 by 36-in. heavy-duty reduction unit which is added to increase the crushing capacity of the plant and balance it with the rest of the plant. The finished product feeds by means of an extended delivery conveyor to a 23-cu. yd. jack leg steel bin. The power unit is mounted on the truck with the balance of the plant. Numerous variations in the details of this plant are made to suit conditions. They can also be equipped with rotary instead of vibrating screens if desired.

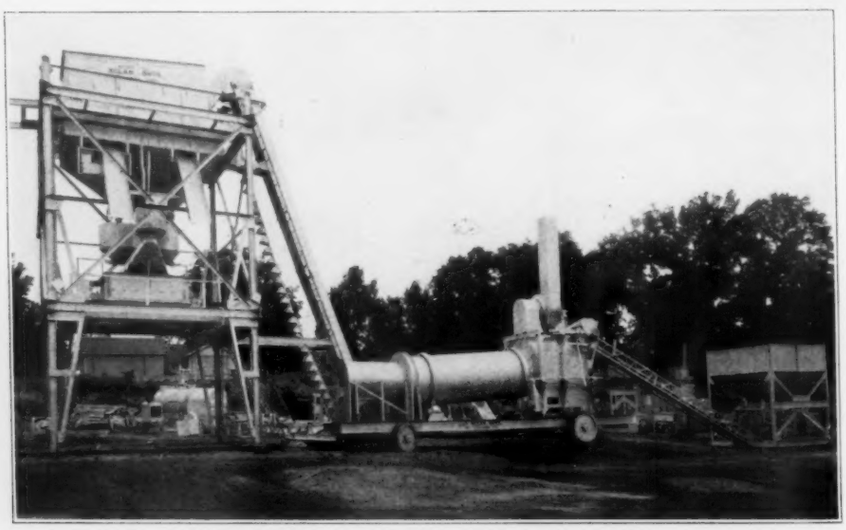
Another of these units is a combination of the standard one-piece and straight-line outfits. The feed conveyor is detachable and is the only part of the plant not mounted on the same trucks. This plant is equipped with a 2 by 6-ft. Niagara screen, a 9 by 24-in. jaw crusher, a small surge hopper, rejects bucket elevator, and a short folding-type 24-in. delivery conveyor which is folded back out of the way by a cable-raising device when the unit is being moved. The truck unit is mounted on rubber tires with roller-bearing wheels. This unit is made in a wide range of sizes.

Mobile Asphalt Plants

Mobile asphalt plants consisting of three units, the mixing unit, the asphalt-heating unit and the boiler unit, designed by the Madsen Iron Works, Los Angeles, Cal., are now manufactured by the Blaw-Knox Co., Pittsburgh, Pa., for sale in territories in the United States east of the Rocky Mountains and in countries outside of the United States. These plants prepare and mix the material for all types of asphalt, bituminous-concrete, oil mix and cold-laid pavements. The entire plant is fully portable.



Cedar Rapids portable aggregate plant.



Cedar Rapids batch-type portable asphalt-mixing plant.

Each of the three units is so designed that the frame members act as the chassis on which they are moved. This design allows the permanent mounting and alignment of all operating parts. The mixing units proper comprises the general assembly of the elevator, drier and screen, aggregate bin, aggregate weigh box, asphalt-weighing equipment, twin-shaft pug-mill mixer, and electric power drive. For Diesel or gasoline engine drive the power unit is separate. At each of the four corners of the upper platform a ratchet-operated jack is built in. The drier-screen and mixer units are raised or lowered on the corner columns by operating these jacks.

The asphalt-heating unit is said to be of sufficient capacity to insure a continuous supply of hot bituminous material under any present specification. The boiler is permanently mounted on a steel frame, on which it is operated and transported and is thoroughly insulated and completely equipped. A feature of the Madsen Blaw-Knox asphalt plant is the asphalt gun. This is a steam-ram-operated injector which forces a weighted quantity of asphalt cement into the mixer when the operator moves the control valve.

Eighteen tons per hour from a No. 19 Crusher–100% through three-eighth inch opening using less than fifteen horsepower

THE following is the result of a test on a No. 19 Kennedy Ball Bearing Gearless Crusher.

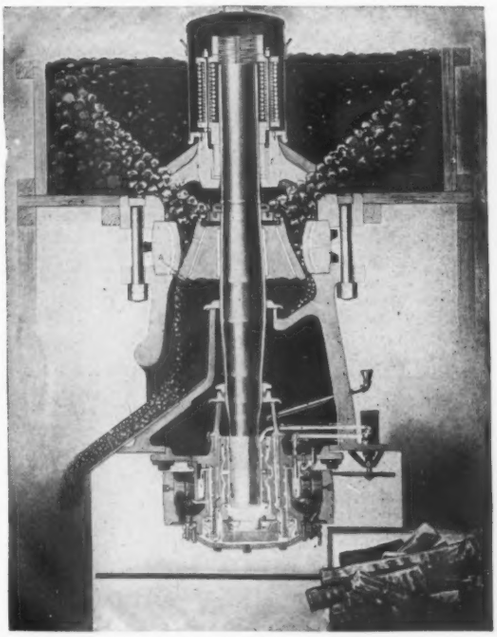
Exceedingly hard glacial gravel, 1½" and plus ⅜", was crushed for sand for concrete purposes, and less than fifteen horsepower was used.

The same crusher can be opened up and 1½" stone can be produced at a rate of from 30 to 50 tons per hour.

With the opening set to ⅛" on the closed side the following results were obtained:

Minus ⅜"	100 %
Plus 3 mesh	21½%
Minus 3—Plus 4	17 %
Minus 4—Plus 14	36½%
Minus 14—Plus 48	15 %
Minus 48—Plus 100	4 %
Minus 100	5½%

This was crushed at the rate of 18 tons per hour.



Built in various sizes with receiving openings from 1¾" to 14". Produces sizes from ⅛" to 3", with capacities up to 620 tons per hour on the larger sizes.

The Kennedy Ball Bearing Gearless Gyratory Crusher is guaranteed to do more crushing, size for size, of any given material, with less power consumption, than any crusher ever built. 90% Of the power input to motor is applied direct to breaking the rock between head and concaves. The head and shaft of the type "S" crusher is suspended on springs to permit tramp steel to pass through. The ball-and-socket eccentric is self-aligning. This crusher may be operated by a synchronous motor, built in the pulley of the crusher, or by belt from standard motor. This crusher takes one-half the power required for a geared crusher, and saves 80% in the cost of maintenance.

We manufacture a complete line of primary jaw and gyratory crushers, ball mills, rod mills, screening, elevating, and conveying equipment, etc. Complete information describing any or all of this machinery will be sent on request. *Send for latest information on our vibrating screen.*

KENNEDY-VAN SAUN MFG. and ENG. CORP.

Two Park Avenue — New York, N. Y.

BRANCH OFFICES:—Chicago; 120 South La Salle St. Birmingham, Ala.; Comer Building. Los Angeles, Calif.; 416 South Spring St. London, England; Bush House. Paris, France; 40 Rue des Mathurins. Johannesburg, S. Africa; 73 Cullinan Bldg. Canadian Agents; The William Kennedy & Sons, Ltd., Owen Sound, Ont. Walkers Limited, Maryborough, Queensland, Australia. New Zealand Agents; Booth, MacDonald & Co., Ltd., Christchurch.

Classified Buyers' Guide

A Directory of Pit and Quarry Advertisers Arranged According to Product

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified, if brought to the attention of the Advertisers' Service Department.

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Agitating Ladders (Dredge)
*Eagle Iron Works

Air Compressors (Portable)
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Agitators, Thickeners and Slurry Mixers
*Smidth and Co., F. L.

Air Separators
Gay, Rubert M.
*Gruendler Crusher & Pulv. Co.
Raymond Bros. Impact Pulv. Co.
Universal Road Machy. Co.

Alloys, Steel
Chicago Steel Foundry Co.

Ash and Refuse-Handling Equipment
Allen-Sherman-Hoff Co.
*Bartlett & Snow Co., C. O.
Good Roads Machy. Corp.
*Hetherington & Berner, Inc.
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*Link-Belt Co.
Stephens-Adamson Mfg. Co.

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*Bartlett & Snow Co., C. O.
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*Link-Belt Co.
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*Merrick Scale Mfg. Co.

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*Sprout, Waldron & Co.
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*Bartlett & Snow Co., C. O.
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*Link-Belt Co.
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*Sprout, Waldron & Co.
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Cars (Dump)
Stephens-Adamson Mfg. Co.

Cars (Industrial)
Stephens-Adamson Mfg. Co.

Cars (Quarry)
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Cars (Transfer)
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*Bartlett & Snow Co., C. O.
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*Eagle Iron Works
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Krupp Grusonwerk, Fried.
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*Sprout, Waldron & Co.
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*Bartlett & Snow Co., C. O.
Cross Engineering Co.
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*Link-Belt Co.
*Sprout, Waldron & Co.
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Chutes and Chute Liners
*Bartlett & Snow Co., C. O.
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*Hendrick Mfg. Co.
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Jeffrey Mfg. Co.
McLanahan and Stone Corp.
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*Smidth and Co., F. L.
*Sprout, Waldron & Co.
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Bendelari, F. N.
Iowa Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
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*American Steel & Wire Co.

Clutches
Jeffrey Mfg. Co.
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*Sprout, Waldron & Co.

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*Allis-Chalmers Mfg. Co.
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*Deister Concentrator Co.

Cones (Sand-Washing)
*Bartlett & Snow Co., C. O.
Iowa Mfg. Co.
*Link-Belt Co.
Smith Engr. Works

Conveyor Belting (See Belting)

Conveyors Idlers and Rolls
Barber-Greene Co.
*Bartlett & Snow Co., C. O.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
*Link-Belt Co.
Stephens-Adamson Mfg. Co.

Conveyors and Elevators
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Barber-Greene Co.
Chicago Steel Foundry Co.
Cross Engineering Co.
Good Roads Machy. Corp.
*Gruendler Crusher & Pulv. Co.
*Hendrick Mfg. Co.
Iowa Mfg. Co.
Jeffrey Mfg. Co
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
Pioneer Gravel Equipment Mfg. Co.
Smith Engr. Works
*Sprout, Waldron & Co.
Stephens-Adamson Mfg. Co.
Universal Crusher Co.
Universal Road Mchy. Co.

Conveyors (Ready-Mixed Concrete)
*Bartlett & Snow. Co., C. O.
Jeffrey Mfg. Co.

Coolers (See Kilns and Coolers —Rotary)

Correcting Basins
*Smidth and Co., F. L.

Couplings (Flexible and Shaft)
Jeffrey Mfg. Co.
*Link-Belt Co.
*Sprout, Waldron & Co.
Stephens-Adamson Mfg. Co.

Couplings (Hose, Pipe, etc.)
Thermoid Rubber Co.

Cranes (Crawler and Locomotive)
Austin-Western Road Mchy. Co.
*Link-Belt Co.
Ohio Power Shovel Co.

Crusher Parts
*American Pulverizer Co.
*Bartlett & Snow Co., C. O.
Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Krupp Grusonwerk, Fried.
McLanahan and Stone Corp.

Crushers (Cone)
*Nordberg Mfg. Co.

Crushers (Hammer)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
Austin-Western Road Mchy. Co.
*Bartlett & Snow Co., C. O.
*Dixie Machy. Mfg. Co.
Good Roads Machy. Corp.
*Gruendler Crusher & Pulv. Co.
Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Universal Crusher Co.

Crushers (Jaw and Gyratory)
*Allis-Chalmers Mfg. Co.
Austin-Western Road Mchy. Co.
*Bartlett & Snow Co., C. O.
Good Roads Machy. Corp.
*Gruendler Crusher & Pulv. Co.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Krupp Grusonwerk, Fried.
Lewistown Foundry & Machinery Co.
*Nordberg Mfg. Co.
Pioneer Gravel Equipment Mfg. Co.
Smith Engr. Works
Universal Crusher Co.
Universal Road Mchy. Co.

Crushers (Ring)
*American Pulverizer Co.
*Bartlett & Snow Co., C. O.

Crushers (Roll)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
Austin-Western Road Mchy. Co.
*Bartlett & Snow Co., C. O.
*Gruendler Crusher & Pulv. Co.
Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
Pioneer Gravel Equipment Mfg. Co.

Crushers (Rotary)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
Austin-Western Road Mchy. Co.
*Bartlett & Snow Co., C. O.

Crushing Rolls
*Allis-Chalmers Mfg. Co.
Austin-Western Road Mchy. Co.

*** See also information in the 1933 Pit and Quarry HANDBOOK.**

S-A Equipment Pays

The compact screening and rinsing section of the gravel plant recently completed by Stephens-Adamson for the Lake Erie Mining Co. The two S-A Vibrator Screens shown, can wash and screen five sizes of aggregate for the Lake Erie concrete batching plant, which was also equipped by S-A.

If you would like to cut your screening, washing or handling costs, call or write for an S-A engineer. He will study your deposit, plant, and every local condition. Then he will make an honest recommendation for any equipment or changes necessary to improve your product and cut operating and handling costs.

You can depend upon every conveyor, screen, washer, etc., and every gravel, stone or batching plant designed and built by Stephens-Adamson. Every unit and every plant is the result of over 30 years of experience and hundreds of successful installations.

S-A "Pacific" belt conveyor carriers, with all-steel rollers and Timken bearings are used throughout the Lake Erie Mining Co. plants.

Write Today for literature describing S-A equipment. Catalog 34 illustrates S-A equipment for sand, gravel and stone plants. The Concrete Batching Plant Catalog shows how the successful S-A plants are equipped. The Vibrator Screen Catalog describes the well known "normal-duty" and "heavy-duty" Vibrator Screens.

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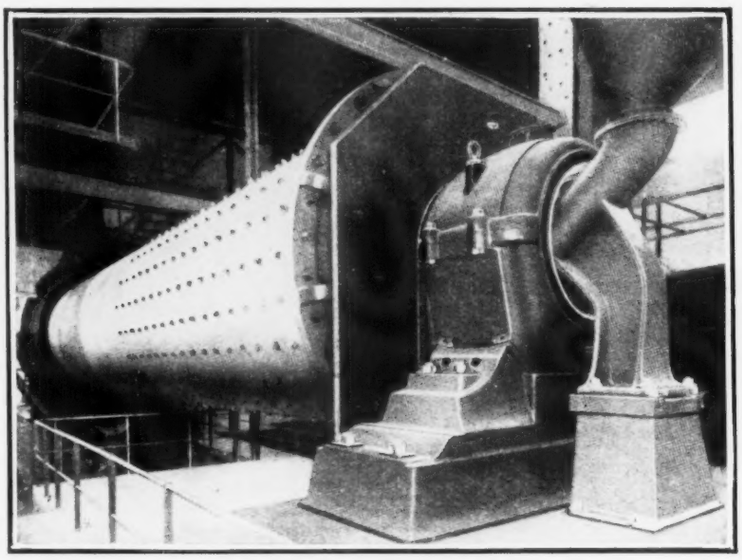

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MAGDEBURG (Germany)

Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

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*Bartlett & Snow Co., C. O.
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*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.

Detonators
Atlas Powder Co.
*Hercules Powder Co.

Diesel Engines (See Engines—Diesel)

Dragline Cableway Excavators
Good Roads Machy. Corp.
*Link-Belt Co.
*Sauerman Bros., Inc.

Dragline Excavators
Austin-Western Road Mchy. Co.
*Link-Belt Co.
Ohio Power Shovel Co.
*Sauerman Bros., Inc.

Dredges
*Hetherington & Berner, Inc.
*Morris Machine Works

Drilling Accessories
Loomis Machine Co.

Drilling Contractors
Mott Core Drilling Co.
Pennsylvania Drilling Co.
Sprague and Henwood Inc.

Drills (Blast-Hole)
Loomis Machine Co.

Drills, Diamond
Mott Core Drilling Co.
Pennsylvania Drilling Co.
Sprague and Henwood Inc.

Drills (Rock)
Jeffrey Mfg. Co.
Loomis Machine Co.

Drills (Well) (See Drills—Blast-Hole)

Drives (Multiple, Belt, Chain, Rope)
*Allis-Chalmers Mfg. Co.

Dryers
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
Iowa Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Krupp Grusonwerk, Fried.
Lewistown Fdry. & Mch. Co.
McLanahan and Stone Corp.

Dust-Collecting Systems
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Raymond Bros. Impact Pulv. Co.

Dust Handling Systems (Hydro Vacuum)
Allen-Sherman-Hoff Co.

Dynamite (See Explosives)

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*Allis-Chalmers Mfg. Co.

Elevator Belting (See Belting)

Elevators (See Conveyors and Elevators)

Engineers
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
Cross Engineering Co.
*Hetherington & Berner, Inc.
Iowa Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.
*Smidth and Co., F. L.
*Sprout, Waldron & Co.
Stephens-Adamson Mfg. Co.

Engines (Diesel)
*Nordberg Mfg. Co.

Engines (Internal-Combustion)
Amplex Mfg. Co.
*Nordberg Mfg. Co.

Engines (Steam)
*Morris Machine Works
*Nordberg Mfg. Co.

Excavating Machinery (See Shovels; Cranes; Buckets; etc.)

Explosives
Atlas Powder Co.
*Hercules Powder Co.

Fans (Exhaust)
Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Feeders
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
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Morrow Mfg. Co.
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Smith Engr. Works
*Sprout, Waldron & Co.
Stephens-Adamson Mfg. Co.

Floor Sweeping Systems (Hydro Vacuum)
Allen-Sherman-Hoff Co.

Fuses (Detonating)
Atlas Powder Co.
*Ensign-Bickford Co.
*Hercules Powder Co.

Gaskets
Goodyear Tire & Rubber Co.
Thermoid Rubber Co.

Gasoline Engines (See Engines—Internal-Combustion)

Gates (Bin) (See Bin Gates)

Gears and Pinions
*Bartlett & Snow Co., C. O.
Jeffrey Mfg. Co.
*Link-Belt Co.
*Sprout, Waldron & Co.

Gears (Herringbone)
*Bartlett & Snow Co., C. O.
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*Link-Belt Co.
*Sprout, Waldron & Co.

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Grating (Steel)
*Bartlett & Snow Co., C. O.
*Hendrick Mfg. Co.

Grinding Balls (See Balls, Grinding)

Grizzlies
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
*Eagle Iron Works
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*Hendrick Mfg. Co.
Iowa Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdy. & Mach. Co.
Smith Engr. Works
Stephens-Adamson Mfg. Co.
Universal Road Mchy. Co.

Guards (Wire)
*Bartlett & Snow Co., C. O.
National Wire Cloth Co.

Guns (Hydraulic)
Georgia Iron Works
*Hetherington & Berner, Inc.

Hammer Mills (See Crushers—Hammer)

Hoists
*Bartlett & Snow Co., C. O.
*Hetherington & Berner, Inc.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Pioneer Gravel Equipment Mfg. Co.
*Sauerman Bros., Inc.
Smith Engr. Works
*Sprout, Waldron & Co.
Stephens-Adamson Mfg. Co.

Hoppers
*Hendrick Mfg. Co.

Hose (Air, Steam and Water)
Goodyear Tire & Rubber Co.
Thermoid Rubber Co.

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Hydraulic Guns (See Guns—Hydraulic)

Idlers
Barber-Greene Co.
*Bartlett & Snow Co., C. O.
Good Roads Machy. Corp.
Jeffrey Mfg. Co.
*Link-Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.
Stephens-Adamson Mfg. Co.

Jigs (Diaphragm)
Bendelari, F. N.

Kilns and Coolers (Rotary)
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Krupp Grusonwerk, Fried.
*Smidth and Co., F. L.

Kominuters
*Smidth and Co., F. L.

Lifter Plates
Chicago Steel Foundry Co.

Lime-Handling Equ'pment
*Bartlett & Snow Co., C. O.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
*Link-Belt Co.
Raymond Bros. Impact Pulv. Co.
Stephens-Adamson Mfg. Co.

Lime Kilns
*Bartlett & Snow Co., C. O.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Krupp Grusonwerk, Fried.

Linings (Ball- and Tube-Mill) (See Mill Liners and Linings)

Loaders and Unloaders
Barber-Greene Co.
*Bartlett & Snow Co., C. O.
Good Roads Machy. Corp.
Jeffrey Mfg. Co.
*Link-Belt Co.
*Sprout, Waldron & Co.
Stephens-Adamson Mfg. Co.

Locomotives (Electric, Gas and Steam)
*Lima Locomotive Works

Locomotives (Trolley-Battery)
Jeffrey Mfg. Co.

Magnetic Pulleys (See Pulleys, Magnetic)

Mill Liners and Linings
*Bartlett & Snow Co., C. O.
Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Smidth and Co., F. L.

Mills (Grinding) (See also Crushers—Hammer)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
*Bartlett & Snow Co., C. O.
*Gruendler Crusher & Pulv. Co.
Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Krupp Grusonwerk, Fried.
Lewistown Fdy. & Mch. Co.
Raymond Bros. Impact Pulv. Co.
*Smidth and Co., F. L.
*Sprout, Waldron & Co.

Motor Trucks
General Motors Truck Co.

Motors and Generators
*Allis-Chalmers Mfg. Co.

Motors (Internal-Combustion) (See Engines — Internal-Combustion)

Nails
*American Steel & Wire Co.

Nozzles (Hydraulic) (See Guns—Hydraulic)

Packings
Goodyear Tire and Rubber Co.

Partitions (Wire)
National Wire Cloth Co.

Pawls
Stephens-Adamson Mfg. Co.

Perforated Metal Plates
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
Chicago Perforating Co.
Cross Engineering Co.
*Hendrick Mfg. Co.
Morrow Mfg. Co.
*Sprout, Waldron & Co.

Pipe Flanges
Georgia Iron Works
*Hetherington & Berner, Inc.

Plug Valves (See Valves)

Pneumatic Drills (See Drills, Rock)

Portable Conveyors
Barber-Greene Co.
Good Roads Machy. Corp.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
*Link-Belt Co.
*Sprout, Waldron & Co.
Stephens-Adamson Mfg. Co.

Portable Crushing and Screening Plants
Austin-Western Road Mchy. Co.
Barber-Green Co.
*Bartlett & Snow Co., C. O.
*Gruendler Crusher & Pulv. Co.
Iowa Mfg. Co.
Jeffrey Mfg. Co.
Pioneer Gravel Equipment Mfg. Co.
Stephens-Adamson Mfg. Co.
Universal Crusher Co.

Portable Engines (See Engines—Internal Combustion)

Portable Loaders (See Loaders and Unloaders)

Power Cables (Rubber Clad)
*American Steel & Wire Co.

Power Shovels (See Shovels, Electric, Internal-Combustion and Steam)

Pulleys (Magnetic)
*Sprout, Waldron & Co.

Pulleys (Wing)
*Sprout, Waldron & Co.

Pulverized Fuel Systems
*Bartlett & Snow Co., C. O.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Raymond Bros. Impact Pulv. Co.

Pulverizers (See also Crushers; Mills; etc.)
*American Pulverizer Co.
Austin-Western Road Mchy. Co.
*Bartlett & Snow Co., C. O.
Gay, Rubert M.
Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Krupp Grusonwerk, Fried.
Lewistown Foundry & Machinery Co.
Raymond Bros. Impact Pulv. Co.
*Smidth and Co., F. L.
Universal Crusher Co.
Universal Road Mchy. Co.

Pump Valves (See Valves Pump)

Pumps (Cement Slurry)
Allen-Sherman-Hoff Co.
*Morris Machine Works
*Smidth and Co., F. L.

Pumps (Centrifugal)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Georgia Iron Works
*Hetherington & Berner, Inc.
Kansas City Hay Press Co.
*Morris Machine Works

Pumps (Dredging)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Georgia Iron Works
*Hetherington & Berner, Inc.
*Morris Machine Works

Pumps (Sand and Gravel)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Georgia Iron Works
*Hetherington & Berner, Inc.
Kansas City Hay Press Co.
*Morris Machine Works

Ready-Mixed Concrete Plants
*Bartlett & Snow Co., C. O.
Stephens-Adamson Mfg. Co.

Rock Drills (See Drills—Rock)

Rod Mills
*Kennedy-Van Saun Mfg. and Eng. Corp.

Rope (Wire) (See Wire Rope)

*** See also information in the 1933 Pit and Quarry HANDBOOK.**

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It delivers an absolutely uniform product of any fineness desired from 60 to 400 mesh with greater capacity and lower power cost than is possible with any other type of air separator.

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It is a special four-cylinder compressor, V-belt driven by a 4-cylinder engine.

Compressor intake and delivery valves are mechanically operated—an exclusive Chrysler feature. The special governing device allows the compressor to operate at speeds according to the demand for air, making it possible for its 136 cu. ft. displacement to equal the performance of compressors with ratings as much as 50 per cent higher.

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AMPLEX DIVISION

DETROIT, MICH.

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A Directory of PIT AND QUARRY Advertisers Arranged According to Product

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Rubbish Burners
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Jeffrey Mfg. Co.
*Link-Belt Co.
Pioneer Gravel Equipment Mfg. Co.
Smith Engr. Works
Stephens-Adamson Mfg. Co.

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Austin-Western Road Mchy. Co.
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*Link-Belt Co.
Pioneer Gravel Equipment Mfg. Co.
*Sauerman Bros., Inc.

Screens
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
Chicago Perforating Co.
*Deister Concentrator Co.
Deister Machine Co.
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*Eagle Iron Works
Gay, Rubert M.
*Gruendler Crusher & Pulv. Co.
*Hendrick Mfg. Co.
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National Wire Cloth Co.
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Smith Engr. Works
*Sprout, Waldron & Co.
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Universal Crusher Co.
Universal Road Mchy. Co.
*Universal Vibrating Screen Co.

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*Allis-Chalmers Mfg. Co.
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Barber-Greene Co.
*Bartlett & Snow Co., C. O.
*Deister Concentrator Co.
Deister Machine Co.
Gay, Rubert M.
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Iowa Mfg. Co.
Jeffrey Mfg. Co.
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Pioneer Gravel Equipment Mfg. Co.
Productive Equip. Corp.
Smith Engr. Works
*Sprout, Waldron & Co.
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Universal Road Mchy. Co.
*Universal Vibrating Screen Co.

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*Smidth and Co., F. L.

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*Allis-Chalmers Mfg. Co.
*Eagle Iron Works
*Gruendler Crusher & Pulv. Co.
*Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
*Sprout, Waldron & Co.

Shovels (Electric, Internal Combustion and Steam)
Austin-Western Road Mchy. Co.
*Link-Belt Co.
Ohio Power Shovel Co.

Silos
*Smidth and Co., F. L.

Skip Hoists and Skips
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
*Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
*Link-Belt Co.
Stephens-Adamson Mfg. Co.

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Iowa Mfg. Co.
*Link-Belt Co.
Stephens-Adamson Mfg. Co.

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Sprockets and Chain
*Bartlett & Snow Co., C. O.
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Jeffrey Mfg. Co.
*Link-Belt Co.
*Sprout, Waldron & Co.
Stephens-Adamson Mfg. Co.

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Steel (Alloy)
Chicago Steel Foundry Co.

Steel Grating (See Grating, Steel)

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Steel Plate Construction
*Hendrick Mfg. Co.
*Hetherington & Berner, Inc.
*Sprout, Waldron & Co.

Storage Equipment
*Bartlett & Snow Co., C. O.
Jeffrey Mfg. Co.
*Link-Belt Co.
*Sauerman Bros., Inc.
Stephens-Adamson Mfg. Co.

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Allen-Sherman-Hoff Co.

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*Bartlett & Snow Co., C. O.
*Hendrick Mfg. Co.

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Iowa Mfg. Co.
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*Nordberg Mfg. Co.

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*Allis-Chalmers Mfg. Co.

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*American Steel & Wire Co.

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*Allis-Chalmers Mfg. Co.

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*Allis-Chalmers Mfg. Co.
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*Gruendler Crusher & Pulv. Co.
Jeffrey Mfg. Co.
*Link-Belt Co.
Stephens-Adamson Mfg. Co.

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*Link-Belt Co.
Stephens-Adamson Mfg. Co.

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*Bartlett & Snow Co., C. O.

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*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.

Unloaders (Box Car)
Barber-Greene Co.
*Bartlett & Snow Co., C. O.
Jeffrey Mfg. Co.
*Link-Belt Co.
Stephens-Adamson Mfg. Co.

Variable Speed Reducers or Transmissions
*Link-Belt Co.
Stephens-Adamson Mfg. Co.

Vibrating Screen Plate
*Bartlett & Snow Co., C. O.
Chicago Perforating Co.
Cross Engineering Co.
*Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Morrow Mfg. Co.

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Washers (Sand, Gravel, and Stone)
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
Bendelari, F. N.
*Eagle Iron Works
Good Roads Machy. Corp.
Iowa Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Pioneer Gravel Equipment Mfg. Co.
*Smidth and Co., F. L.
Smith Engr. Works
Stephens-Adamson Mfg. Co.
Universal Road Mchy. Co.

Weighing Equipment (Automatic)
*Merrick Scale Mfg. Co.

Welding Supplies
*American Steel & Wire Co.

Well Drills (See Drills—Well)

Wheels (Car)
*Eagle Iron Works
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*Bartlett & Snow Co., C. O.
Jeffrey Mfg. Co.
*Link-Belt Co.
*Sprout, Waldron & Co.
Stephens-Adamson Mfg. Co.

Wire & Cable (Electric)
*American Steel & Wire Co.

Wire Cloth
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Williamsport Wire Rope Co.

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Wire Rope Slings
*American Steel & Wire Co.
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Wire (Welding)
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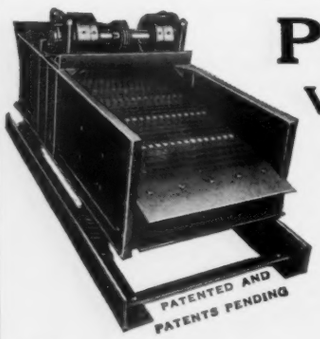
Worm Gears (See Gears and Pinions)

*** See also information in the 1933 Pit and Quarry HANDBOOK.**



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Built in all standard sizes and in either single, double or triple deck. Write for Bulletin No. 21.

DEISTER MACHINE COMPANY
1933 EAST WAYNE STREET FT. WAYNE, IND.

LEADERS SINCE 1835

CRUSHERS—Double roll and Sledge Wedge Crushers, for practically any product. Capacities to 1000 tons an hour.

SUPER DRY PANS—For especially large tonnages.

WASHERS AND SCRUBBERS—Steel log Washers; scrubbers, cylinder washers, sand drags and washing screens.

DRYERS—Revolving cylindrical, of various sizes.

JIGS—For concentrating and beneficiating hematite and manganese ores.

SCREENS—Cylindrical and conical screens of any size and capacity.

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Spiral Screw and Log Washers, De-Waterers and Shale Removers, Flume Classifiers, Swintek Ladder Suction Screen Nozzles, Chain Type Cutters, Barges and Pontoons, A Frame and Gantry Hardware, Vibrating and Revolving Screens, Steel Dump Cars, Grizzlies, Car Wheels and Trucks, Steel Bins, Water Tanks, Structural Towers, and Dry Pans.

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Machinists — Founders
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Perforated Metals—Screens of All Kinds—For Sand, Gravel, Stone, Etc.
MATERIAL IN STOCK
PROMPT SHIPMENT
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BARGAINS
in
FACTORY REBUILT
LIMA
SHOVELS, DRAGLINES and CRANES

These machines are today's most SENSATIONAL BARGAINS

IF your work demands additional loading or stripping equipment; or if your present shovel, dragline or crane is no longer efficient, then it will be to your advantage to write for further information and prices of these good-as-new machines. They are offered in ¾ to 1½ yard capacity. Each machine carries a new machine guarantee. Each machine is convertible into crane, dragline or shovel. Write today.

The Ohio Power Shovel Company
Division of Lima Locomotive Works, Incorporated
LIMA, OHIO, U. S. A.

Sauerman Slackline Scraper

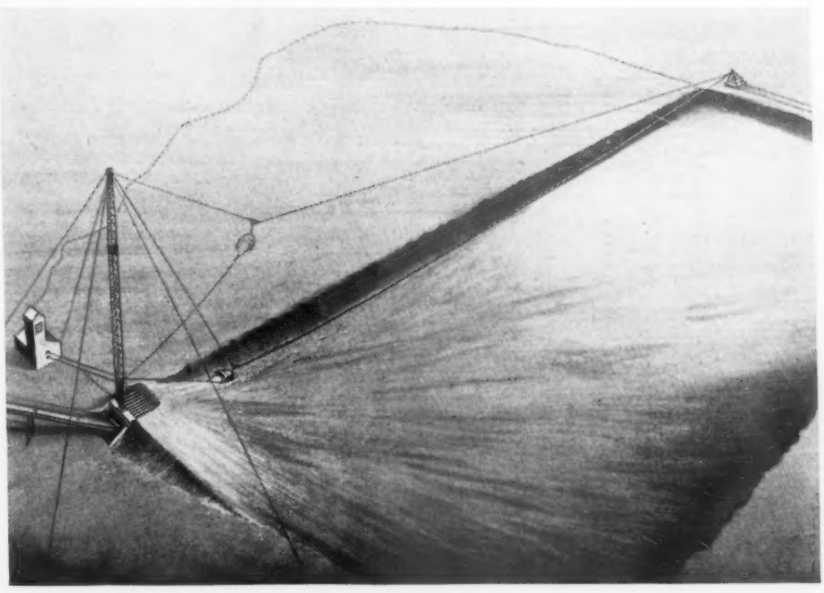
For handling Sand, Gravel, Overburden in quantities of 2,000 to 5,000 tons per day

To assure maximum profits from the operation of a large sand and gravel plant it is essential to use a system of excavating and conveying that is capable of keeping ahead of the plant's screening capacity at the peak of a busy season and that is sufficiently flexible to handle a smaller tonnage economically whenever there is a lull in demand.

Such an excavator-conveyor is the new Sauerman Slackline Scraper. The sketch at right shows one of these machines spanning a wide, flat deposit. It is just as well suited to taking materials from an underwater pit or from a bank.

Write for further details.

SAUERMAN BROS., Inc.
434 S. Clinton St., Chicago



Self-Interest Demands It---

THE coming conventions of the National Crushed Stone Association, the National Sand & Gravel Association and the National Slag Association will be the first gatherings of these industries since President Roosevelt's approval of their Code of Fair Competition. They will provide your first opportunity to discuss with other producers the problems raised by actual operation under the code. Each of the three associations will hold a separate convention, but all three conventions will run concurrently and there will be joint sessions for complete interchange of ideas between members of the three industries.

The Board of Directors of each association will meet separately on Sunday, January 21.

The Code Authority (for all three industries) will meet Monday, January 22.

Separate sessions of the 17th Annual Convention of the National Crushed Stone Association, the 18th Annual Convention of the National Sand & Gravel Association, and the Annual Convention of the National Slag Association will open Tuesday, January 23, and continue through Friday, January 26.

Arrangements for reduced railroad fares are in progress and full information will be announced later. The Netherland Plaza Hotel, Cincinnati, where the meetings will be held, will send registration cards to all producers before the conventions, enabling them to make reservations in advance. Self-interest demands that you attend.

Decide AT ONCE which members of your company should attend, and make your reservations EARLY.

1934 Meetings

Board of Directors
January 21

Code Authority
January 22

Conventions
January 23-26

Netherland Plaza Hotel
Cincinnati

NATIONAL CRUSHED STONE ASSOCIATION
NATIONAL SAND & GRAVEL ASSOCIATION
NATIONAL SLAG ASSOCIATION

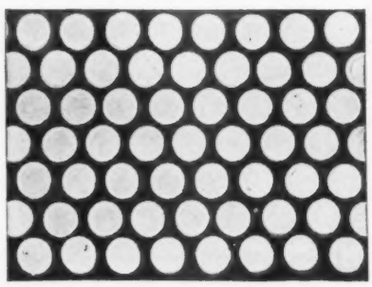
DOWN

Down go blasting costs when the right explosives are correctly used. Talk it over with Hercules and see what can be done about getting your blasting costs down.

HERCULES POWDER COMPANY
INCORPORATED
Wilmington, Delaware

A-35

MORROW SCREEN PLATES

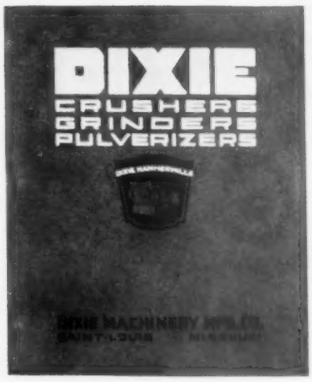


MORROW PERFORATED METAL SCREEN PLATES for sizing and preparing coal, sand, gravel, stone and other bulk materials are made by a Company specializing in screening machinery.

A complete set of punches and dies covering a wide range of sizes, in round, square, oval and diagonal slots are ready for the press, insuring prompt delivery of orders.

Prices are right.
Send for Bulletin 57.

The Morrow Manufacturing Co.
Wellston, Ohio



A True, Non-Clogging Hammermill

This Booklet Can Save You Many Dollars

If you have limestone, shale, gypsum, lime, clay, kaolin, fuller's earth, asphalt rock, marl—anything from a pit or quarry—that you want crushed, you need a Dixie Hammermill.

If this material is muddy or sticky, it won't—it can't—clog in a Dixie.

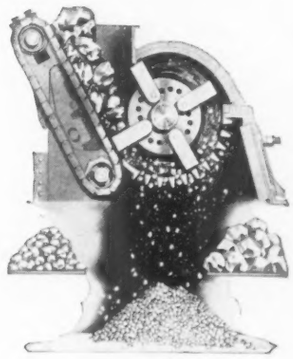
The Dixie Hammermill is a simple, sturdy swing hammer crusher, pulverizer or grinder, that incorporates principles found in no other equipment.

The specially designed, constantly moving breaker plate positively prevents clogging, and makes for more wear, and less replacement. It is sturdily constructed of individual links that force the material down in a way found in no other crusher. In the crushing department of one cement plant, this non-clogging feature has eliminated the work of ten men at the feed hopper.

Because the hammers strike at a different point of the breaker plate at each stroke, a more uniform material is assured, and the life of the breaker plate is extended to 26 times the wear of an ordinary stationary breaker plate.

If you are interested in lower crushing costs per ton for 1933, you'll write for free booklet giving detailed descriptions of the complete Dixie line of crushers.

DIXIE
MACHINERY MFG. CO.
4310 GOODFELLOW AVE., ST. LOUIS



For Efficiency and Economy Use the Dixie

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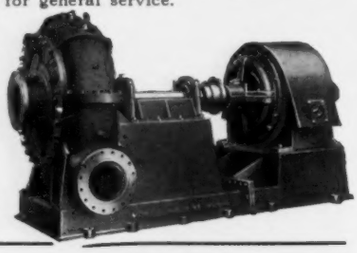
For hydraulic dredging, filling, sand and gravel production; hydraulic conveying of slurry and other liquids containing abrasive materials; clear water pumps for general service.

Also complete dredges with all accessory equipment. Dredging pump designs include heavy-duty types and special alloy parts for severe service. Types and sizes for the largest or smallest operations, and for belt, motor, steam, oil or gasoline-engine drive.



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Export Office: 50 Church St., New York.

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Sand—WASHING TABLES—*gravel*
HYDRAULIC CLASSIFIERS
VIBRATING SCREENS

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The Merrick Weightometer so combines the principles of a platform scale and a mechanical integrator as to record the total weight of material carried by a moving conveyor, without in any way interfering with the operation of the conveyor or need of a weighmaster.

The Merrick Mechanical Weighman is adaptable to all kinds of platform scales—overhead telpher and industrial railway systems, tanks or hoppers.

The Merrick Addoweight is a dial scale with additional features of two counters—one to totalize the weights and the second to count the number of weighings. Used for individual loads on conveyors or monorails.

The Merrick Feedoweight mechanically regulates the feed, as well as weighing and registering the weight, of one or more materials.

MERRICK SCALE MANUFACTURING CO.
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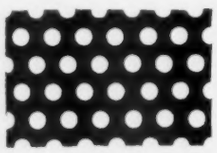

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and particularly the Heat-Treated, Double-Corrugated Plate are popular in the quarry field. They wear well.
Full range of sizes.

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are made to fit. That's the first requisite. Any size or style made. No order too small or too large.

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PYRASTEEL for high temperatures

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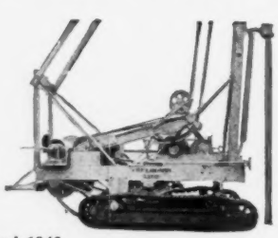

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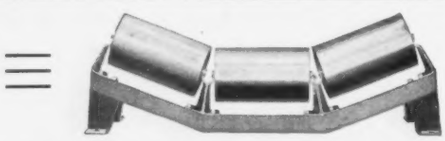

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WITH SW BELT CONVEYORS

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Performance-Tested

BUCKET ELEVATORS
REVOLVING SCREENS
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PRODUCE PERMISSIBLE SAND AND GRAVEL WITH BENDELARI DIAPHRAGM JIGS

THE LIGHT MATERIAL THAT COMES TO THE TOP IN POURING AND TAMPING CAN BE REMOVED

HEAVY SOLUTION TESTS WILL PREDETERMINE WHAT IMPURITIES CAN BE ELIMINATED

F. N. BENDELARI
JOPLIN, MO.

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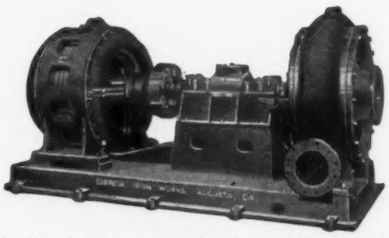

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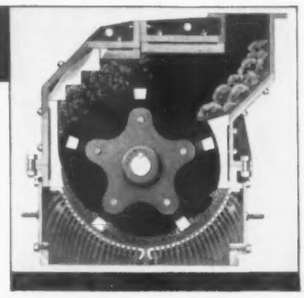

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for EFFICIENT & ECONOMICAL SAND AND GRAVEL WASHING
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Extra HEAVY Pattern Sand Pump

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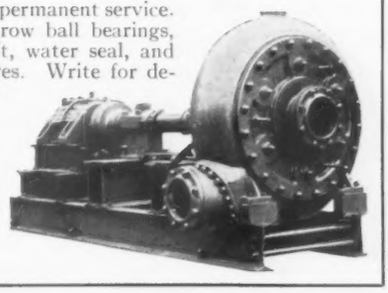

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25, 45, 60, 80, 100, 120, 150, 200, 300, 450, 700 & 1000 HP Full Diesel Engines, some with Generators.
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5—50-B Bucyrus Shovels & Draglines, Steam & Diesel.
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20, 30, 40, 50 Ton Steam & Gas Locomotives.
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1—¾ yd. Hayward E Clam Shell Bucket.
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1—15-ton Steel Stiff Leg Derrick, 80-ft. boom, 38-ft. mast—in A-1 condition.

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3—25-ton American 8-wheel cranes, 50-ft. boom; new in 1930.

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12-yd. Western Air, also Hand Dump Cars, Flats, Gondolas, Steel Hopper Cars, Box Cars.

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1—Browning shovel ⅝ yd. with 35' crane boom.
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1—Chicago gas driven portable 220' Compressor.
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1—Keystone one yard Skimmer.
1—10 ton Holt Tractor with Winch.
1—Universal Truck Crane on a 6½ ton Truck.
2—1 yd. bottom dump Concrete Buckets.
2—1 yd. Hayward Clamshell Buckets.
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1—American 8" cent. pump 1500 GPM@110' head.
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Several Jaw Crushers.
Gas and Electric Motors, 1 HP to 200 HP.
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Considerably below market prices.
20 ton ⅞-in. Hexagon.
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If so—SEND NOW for my LIST showing hundreds of items. Includes—Crushers, Cranes, Conveyors, Compressors, Draglines, Shovels, Drag Scrapers, Slackline Excavators, Cars, Locomotives, Hoists, Derricks, Diesel Engines and Generator Units, Tow Boats, Tugs and Barges, Hydraulic Dredges, Pumps, Buckets, Shovel and Trench Hoe Attachments, Motors, etc.
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We Have Just Purchased One Complete Quarry in Chicago District Offered at Bargain Prices Before Dismantling

CRUSHERS

1—No. 20 Traylor Bull Dog gyratory crusher, type 3950 F.
2—No. 3 McCulley gyratory crushers.
1—Size 42 in. x 16 in. set Allis-Chalmers crushing rolls.

CONVEYORS

2—18 in. x 117 ft. centers Link Belt heavy duty conveyors with self-propelling double discharge trippers.
2—16 in. x 48 ft. centers steel armoured belt conveyors with steel frame.

COMPRESSORS

1—Sullivan Class WG-3, size 14 in. x 12 in. 528 ft. cap. Serial No. 7410, horizontal belt driven.
1—Ingersoll-Rand type NE-1, size 10x10, horizontal belt driven.
1—48 in. dia. x 15 ft. long air receiver for above compressors.

CARS

22—2-yd. cap. 36 in. gauge end dump all steel quarry cars.
2—36 in. gauge quarry car tipples with safety device.

ELEVATORS

2—Link Belt No. 10 bucket elevators, 79 ft. centers, buckets size 18x12x9.
2—Link Belt bucket elevators 30 ft. centers, buckets size 10x8x6.
24—Size 16 in. x 16 in. cast iron bin gates, chain operated.
12—Size 18 in. x 18 in. cast iron bin gates.

HOIST

1—185 HP Allis-Chalmers double drum quarry hoist.

MOTORS

Total 1000 HP in 440 volt, 3 ph. 60 cy. with control equipment.
Slip ring 1—185 HP; 1—150 HP; 2—125 HP; 2—75 HP; 2—55 HP; 1—40 HP; 1—7½ HP.
Squirrel cage 1—75 HP; 1—30 HP; 1—25 HP; 1—20 HP; 1—15 HP; 2—10 HP; 1—1 HP.

PUMPS

1—Allis-Chalmers 5 in. x 4 in. two stage type HVC centrifugal pump, cap. 400 GPM at 450 ft. head.
1—3 in. belt driven centrifugal pump.

SCREENS

2—Allis-Chalmers all steel frame, heavy duty screens, 48 in. dia. x 24 ft. long, in 3 sections, with 1—10 ft. outside section.

PARTIAL LIST OF AVAILABLE ITEMS FROM EITHER OF OUR THREE REBUILDING PLANTS

AIR COMPRESSORS

2—Ingersoll-Rand, cap. 1245 cu. ft. Imperial No. 10, type XCB, 2-stage, size 20x12½x16 in., with 200 HP. or 300 HP. G.E. 2200 v., Syn. motor.
4—Belt driven with A.C. motors, Ingersoll-Rand Class ER-1: 1—528 ft., 2—350 ft., 1—92 ft.
1—Chg. Pneu. 9x11, 150 ft. cap. with 30 HP. motor.
3—Gardner Class XH, 160 cu. ft. Belt Drive.
15—Portable, gasoline driven; cap. 21, 92, 118, 210, 240, 310 cu. ft. Ingersoll-Rand, Sullivan, Chicago Pneumatic, Schramm and Domestic.
2—G.E. Centrifugal compressors, direct connected to 120 HP. A.C. motors, capacity 9000 ft. at 2 lbs. pressure.

CARS

Large lot including std. ga. 6, 12-yd. and 20-yd., 36-ga. 5-yd. and 24-ga. 1½-yd. Also std. ga. flat cars and ballast cars.

CONVEYORS AND ELEVATORS

8—Portable Belt Conveyors with steel frame, gas or electric power; 4—Barber-Greene 24-in. conveyors, 70, 60, 42 and 36-ft. centers; 2—Barber-Greene 18-in. by 42-ft.; 1—Jeffrey 16-in. by 30-ft.; 1—Chgo. Automatic, 24-in. by 60-ft.
3—Robbins 24-in. conveyors with head and tail pulleys and troughing and return rollers for 150, 300 and 500-ft. centers.
5—Vertical bucket elevators with buckets attached to chain, from 42 to 80-ft. centers, some steel enclosed.
2—Barber-Greene Model 42-A bucket loaders on crawlers with 4-cyl. Buda engines.
1—14-in. Link Belt Screw, with steel frames and bearings.
4—12-in. Screw Type, 12 ft. long, silent chain drive.

CRUSHERS

1—No. 5½ Symons coarse cone type.
1—Jeffrey Hammer Mill 24x12.
1—Sturtevant No. 0 Pulverizer.

CRANES AND DRAGLINES

1—Page Spud Walker Dragline 65-ft. boom, Diesel operated with 2-yd. Page bucket and Koehler lighting plant.
1—Northwest Type M Serial No. 2334—60 ft. boom, 1½-yd. dragline or clamshell bucket.
1—Northwest Model 104, Serial No. 1754, 45-ft. boom, 1½-yd. dragline or clamshell bucket.
1—P&H Model 600, with 50 ft. boom, 1-yd. dragline or clam; serial No. 2550.
1—Link Belt gasoline, Model K-1; 10-ton; 50 ft. boom; shop No. K-1024.
1—P & H Model 206, Ser. No. 2075, 40 ft. boom; 1-yd. clamshell; also shovel front with ⅞-yd. dipper.
1—Brownhoist No. 2 gasoline crane; 10-ton cap.; 40 ft. boom; shop Nos. 9964.
1—Bucyrus-Erie Model 1020, Ser. No. 11181, 30-ft. box type boom, ½-yd. dragline or clamshell bucket.
1—Industrial Brownhoist, type CC, gasoline, combination crane and shovel; ½-yd. dipper; 36 ft. boom.
1—Brownhoist No. 1; 7-ton cap.; with 35 ft. boom; gasoline.

CRANES (locomotive)

5—Locomotive cranes; sta. ga. 30 and 25-tons; Ohio, Browning, American, Industrial.

DERRICKS

Steel and wood, stiff leg, or guy.
4—Stiff leg: 1—20-ton Terry, 100′ boom; 2—15-ton American, 100′ boom; 1—10 ton American, 80′ boom.
12—Guy: 10—American, 15 ton; 2—Terry, 15-ton; all 100′ booms.

HOISTS

Gasoline, electric and steam. All sizes.

LOCOMOTIVES

32—Gasoline locomotives from 14-ton to 2-ton, std. 36 and 24-ga.
2—Steam Porter Saddle Tanks; 1—cyl. 14x22, 40-ton, Serial No. 6880; 1—cyl. 16x24, 50-ton, Serial No. 7035.

PNEUMATIC TOOLS

68—Ingersoll-Rand, Chgo. Pneu., and Thor jackhammers, concrete breakers, chipping hammers, spades, reamers, riveting hammers, wood borers, grinders and surfacers.

PUMPS

All sizes and types, both force, centrifugal and steam.

SHOVELS

15—St'm and Gas including 3—50B Bucyrus Nos. 10311, 9857, 9856; 2 Osgood 1½ yd. Nos. 1576 and 1575; 1—Bucyrus 30-B 1¼ yd., No. 2910 and 3—Northwests 2—1 yd., Nos. 2535, 3039, and 1—½ yd., No. 2558.

TRACK

14—Miles 36-in. gauge portable with steel ties.
5—Miles 24-in. gauge portable with steel ties.
100 tons of 35-lb. steel rail.

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BUCKETS

6—Clam Shells, ½ to 1½ yd.
4—Bottom dump, 30 ft.

CRANES, SHOVELS, ETC.

15—Koehring, Northwest, Link-Belt, P. & H., etc.
60—Others, Bucyrus, Monighan, Marion, Erie, etc., ½-yd. to 6-yd. capacity.

PUMPS

12—Centrifugal 3-4-5-6-8 & 15-in.
20—Diaph. & Plungers; all sizes.

HOISTS AND DERRICKS

12—Gas Hoists, 6 to 40 hp.
12—Steam, 7-in.x10-in. to 10-in.x12-in., D.D. and 3 drum.
20—Derricks, various sizes.
Several Sasgen, Stiff Leg and Breast Derricks.

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3—Rex & Koehring 27-E Pavers.
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2—Barber Greene Loaders, 42.
6—Locomotives, 24-, 36-in. ga., 4-8-t. Va. makes.
1—Fordson tractor. 5—Miles 24-in. ga. track.

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16—Concrete and Mortar Mixers from 7 to 28 S.

MISCELLANEOUS

6—Pile Hammers, McKiernan-Terry and Vulcan.
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4—No. 0000, No. 00, No. 0, No. 1 Raymond Mills.
1—Raymond three roll high side Roller Mill.
1—Bartlett & Snow No. 1 Hammer Mill.
2—Jay Bee No. 2B, No. 3B Hammer Mills.
1—Quaker City M-20 Hammer Mill.
1—Chicago Pneumatic type OCE two stage Air Compressor, 1730 C.F.M., with 300 H.P., 3 ph., 60 cy., 2200 v. synchronous motor.
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CARS: side dump 12-yard; 50-ton steel twin hopper cars, etc.

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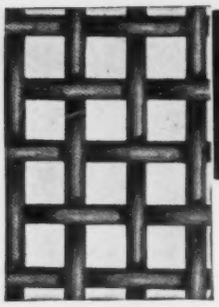
- ☐Separators, Air
- ☐Separators, Dry Centrifugal
- ☐Separators, Magnetic
- ☐Shovels, Gasoline
- ☐Shovels, Steam
- ☐Skips
- ☐Sleeves, Dredge
- ☐Slugs and Nuggets, Grinding
- ☐Speed Reducers and Gears
- ☐Spray Nozzles
- ☐Sprays, Paint
- ☐Sprockets
- ☐Steel, Tool
- ☐Stokers
- ☐Switches, Track
- ☐Tanks, Concrete and Steel
- ☐Tanks, Sand Settling
- ☐Tanks, Wood
- ☐Thickeners, Slurry
- ☐Track, Portable
- ☐Track Shifters
- ☐Tractors, Crawler
- ☐Tramways, Aerial
- ☐Trippers, Belt
- ☐Trippers, Tramway
- ☐Unloaders
- ☐Valves, Pump
- ☐Washers and Scrubbers, Sand, Gravel, Stone
- ☐Weighters, Automatic
- ☐Welding Supplies
- ☐Wheels, Car
- ☐Winches
- ☐Wire Cloth
- ☐Wire Cloth, Manganese Steel

To be used for.....

Firm Name..... *Individual*.....

Address..... *City*..... *State*.....



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Stock Shipments - - - Attractive Prices

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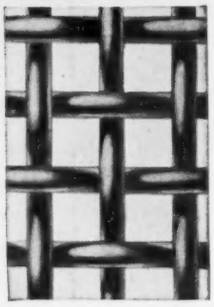

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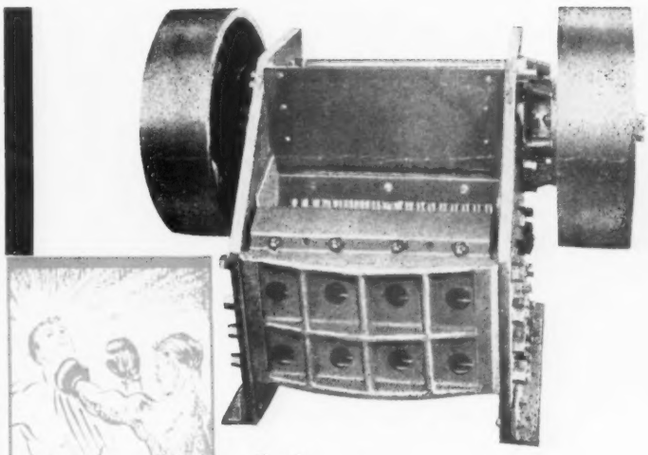

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